See Response 7.1.1 — *[T]he identification of contaminated sediments [may be] greatly underestimated. . . capping dangerous sediments in place . . . will not provide adequate human and environmental protection.*

See Response 7.2.3 — *The use of the SEDCAM model is likely to underestimate recovery rates.*

See Response 8.4.1 — *The use of a 10 percent discount rate over a 30 year period does not accurately reflect the long term costs of monitoring and maintaining a site through institutional controls.*

See Response 1.3.4 — *[A]ll of [the nine criteria used to evaluate the alternatives] are not entitled to equal weight. Protection of human health and the environment must be the most important criteria.*

See Response 1.1.1 and 1.3.5 — *The Puyallup Tribe finds the recommended remedial action alternative totally unacceptable . . . [because it] will not prevent bioaccumulation . . meet tribal standards. . . [and] is not a permanent solution.*

See Response 2.1.4 and 2.1.6 — *The FS must address cumulative health impacts to Tribal families that rely on fish for a large portion of their diets, and to fishermen that spend a lot of time fishing within Commencement Bay . . . [including] effects of dioxins, heavy metals, and thousands of other chemicals [besides PCB mixtures] . . . Cumulative health risks from all dangerous chemicals must be addressed.*

See Response 6.1.1 — *A source control strategy must develop specific plans for [immediate] control of permitted, unpermitted point source, and nonpoint source discharges. . . before significant sediment remediation is undertaken.*

(Plus numerous additional specific comments and attached Superfund Memorandum of Agreement, Puyallup Tribal Water Quality Program, Letter documenting Tribal ARAR, resolution requesting inclusion of Tribal Environmental Standards, and U.S. EPA Drinking Water Regulations and Health Advisories.)

Sierra Club (1989)

See Response 3.3.1 and 6.1.1 — *While we recognize that industry has been located in this area for a good many years, we must not zone the bay into clean and dirty areas, but rather assure multiple uses of the bay. . . Appropriate technologies must be utilized to prevent continued contamination of these waters and adjoining sediments.*

See Response 1.1.2 — *The Sierra Club supports the long-term cleanup goal [of no adverse effects]. . . Of the several potential approaches for establishing sediment quality values, the AET approach seems the best in measuring acute harm. . . SPecific cleanup plans must go beyond the current AET assessment to include a complete assessment of chronic (sublethal) impacts and should address these impacts in the Record of Decision.*

See Response 3.3.2 — *If further refinement does not allow complete assessment of AETs for chronic effects, we recommend that some chemical concentration ten to one hundred times below the lowest AET should be selected as the threshold for cleanup and monitoring, to provide a margin of safety and to allow for the unmeasured chronic effects mentioned above.*

See Response 4.1.1 and 4.2.1	*. . . the AET method is appropriate only as a screening tool to identify areas warranting more thorough environmental investigation . . . [because] AETs cannot demonstrate specific cause and effect relationships. AETs also cannot predict that an environmental effect will be caused by levels of chemicals that exceed the AET level.*
See Response 4.3.2 and 4.3.1	*The AET artificially ascribes all changes in benthic communities as being equally adverse, and assumes all changes are due to the presence of chemical contaminants.*
See Response 4.2.2	*Use of AET is particularly questionable in intertidal areas.*
See Response 4.4.2 and 4.3.1	*Given the probable need to proceed with some cleanup, and in the absence of consensus on sediment quality measurements, the Port supports application of the AET approach defined in the CBG/ENSR report, provided that proper consideration of physical factors is given during cleanup decisions.*
See Response 2.1.1	*The FS overestimates the relative human health risks of sediment contamination in Commencement Bay. . . by using unrealistic assumptions.*
See Response 9.3.3	*Plans for remedial dredging should recognize plans for navigation dredging. When navigation needs are considered, the total volume of sediments requiring confined disposal will be much larger than that predicted solely for remedial dredging.*
See Response 8.2.9	*Feasible and cost-effective strategies for removing contamination under [pier] structures are not identified nor discussed [although] capping or removal of surface sediments involves a high risk of pier structure or slope failure . . . methods are infeasible . . . untried and costs range from $1.7 to $5.5 million.*
See Response 8.2.1	*The FS does not identify cost-effective and feasible disposal sites for the large quantities of sediments designated for cleanup.*
See Response 8.2.3	*The present timetable for cleanup will result in [proposed disposal site in Blair Waterway] Slip 1 not being available. . . other Port owned disposal sites are also not available.*
Deferred	*[T]he agencies [should] consider further the following three [disposal] sites: 1) the Wheeler Osgood Waterway; 2) the Saint Paul Waterway; and 3) the Hylebos Disposal Site #1 (combined use with fisheries enhancement).*
See Response 1.2.4	*In particular, the Port is concerned about the regulatory status of the Integrated Action Plan. . . What is the process for public comment on the IAP?*
See Response 6.1.1	*A systematic look at all sources, their contribution, degree of achievable control, and priorities for control should be defined. The framework for such a plan should be established prior to the ROD. . .*
See Response 5.2.2	*Resolution of source control and drainage planning issues related to the uplands must occur prior to issuance of a ROD for submerged portions of the site. . . Without a RI/FS and a ROD for source control, PRPs cannot obtain CERCLA resolution of Superfund liability.*

(Expansion of comments followed in attachments "Analysis of Proposed Surface Water Source Control Requirements for the Commencement Bay Nearshore/Tideflats Superfund Area" by R.R.

Horner; Hart Crowser review letter; "Contaminated Sediments on Side Slopes of Sitcum Waterway" by Berger/ABAM Engineers; "Review of Various Aspects of Commencement Bay Nearshore/ Tideflats Feasibility Study" by Berger/ABAM Engineers; and "Assessment of Risks Associated with Eating Recreationally Harvested Puget Sound Seafood" by L. Williams and C. Krueger; and public testimony at 6 June 1989 meeting by J. Terpstra.)

Premier Industries Inc. (1989)

See Response 6.1.1 and 7.1.2	*[S]ource control [including non-industrial sources] and natural remediation appear to be the most economical and effective means for cleaning up Commencement Bay.*
See Response 9.2.4	*Further testing and evaluation is mandated to identify and quantify "Toxic Hot Spots" . . .*
Deferred	*As an alternative to removing approximately 11,000 cubic yards of contaminated soil and finding a disposal site [for Wheeler-Osgood sediment], why not construct a sea wall and fill in the waterway with approximately 75,000 cubic yards of dredged material from the City Waterway and cap with clean soil.*

PSWQA (1989)

See Response 1.3.1	*The long-term sediment cleanup goal selected for Commencement Bay is also the sediment goal of the Puget Sound Water Quality Management Plan . . . The Authority supports adoption of this goal.*
See Response 1.2.1	*The Authority supports the use of the apparent effects threshold method (AET) to estimate chemical concentrations associated with harm to marine life. The use of bioassays to refine areas and volumes for remediation is also supported.*
See Response 7.1.2	*The Authority . . . supports the use of natural recovery, after source control has been achieved, for portions of the sites that will recover within ten years. The dilution and burial of moderately contaminated sediments by clean sediment is an acceptable way to accomplish the cleanup goal.*
See Response 7.2.3	*Authority staff have questioned . . . [whether] the rates of recovery predicted by the [SEDCAM] model are too slow and underestimate the rate of natural recovery.*
See Response 6.1.1	*The application of all known, available, and reasonable methods of treatment to all point sources and rigorous application of best management practices to nonpoint sources is required.*
Suggestion noted	*Improved spill prevention programs throughout the drainage basin and improved spill response capabilities should be addressed [in the IAP].*
See Response 9.4.3	*If the continued discharge [that still results in sediment contamination] is clearly in the public interest, a wastewater discharge permit should define a specific sediment dilution zone (also called a sediment impact zone) for the discharge, and require periodic maintenance. . .until better methods of treatment can be identified and implemented. [This permit] should not delay capping or dredging contaminated sediments . . . such cleanup actions provide a clean baseline for monitoring the discharge.*

	potential cleanup and may lengthen the negotiation period. It should not be accepted.
See Response 9.2.3	*[W]hen the proposed 10-year clock for natural remediation starts is not clearly stated. . . It is essential that the sequence of all events be clearly established.*

Occidental Chemical Corporation (1989)

Deferred	*The [RI/FS] reports do not consistently and clearly distinguish that [Occidental Chemical Corporation] is <u>not</u> the identified source of the high priority contaminant PCBs in the mouth of the Hylebos Waterway. . . [a]s a result [of the detailed Remedial Investigation at the OCC Tacoma Plant site] OCC concludes they are not <u>the</u> source for PCBs to the Mouth of the Hylebos.*

Pennwalt Corporation (1989)

See Response 1.1.2	*[The] "no effects" standard is not realistic or achievable as a cleanup standard for an urban waterway like Commencement Bay. Nor is it legally required as a cleanup standard under section 121(d) of SARA, 42 U.S.C. ss 9621(d), the current or proposed National Contingency Plan (NCP), or EPA guidance documents.*
See Response 4.4.2	*[An] alternative cleanup goal [is proposed]: mitigate significant effects to the aquatic ecology. . . Under this objective, only those sediments with significant benthic depressions and which offer significant and measurable ecological benefits would be identified as suitable candidates for active remediation.*
See Response 8.2.10	*The FS does not identify a feasible or cost-effective remedial alternative for the head of Hylebos Waterway. A modified institutional controls alternative should be the preferred alternative for the head of Hylebos Waterway . . . [requiring] removal only of the sediments that would exceed cleanup standards after source controls, natural remediation, and maintenance dredging.*
See Response 8.5.2	*Confined aquatic disposal may be preferable to nearshore disposal for any sediments that require dredging.*
Comment noted	*The FS correctly rejected treatment alternatives*
See Response 8.5.1	*A performance based record of decision is only appropriate if the performance standard is based on a feasible and cost-effective alternative. . . It is impossible to determine whether the cleanup standards and performance criteria are feasible and cost-effective, as CERCLA requires, unless they are tied to a particular remedy.*

(Plus additional comments in an attached report by Kennedy/Jenks/Chilton (1989) following these summary comments.)

Pickering Industries Inc. (1989)

See Response 5.1.3 and 7.1.3 — *We do not agree that [City] waterway needs to be dredged. . . We believe EPA should first control the sources of contamination, and then should leave the City waterway alone for an extended period of time, for example, 10 years or more, to see whether the pollution has abated naturally. . . [i]f it has not, a decision can then be made about dredging.*

See Response 3.3.1 — *We are very concerned that the standards the feasibility study uses are too high for the [City] waterway.*

See Response 2.1.1 — *[Apparently] the feasibility study attempts to clean the City waterway so that English sole do not develop cancerous tumors. . . a person would have to eat absurdly large quantities of fish liver for their entire lives in order to contract cancer from such fish. . . this is totally unrealistic and presents and inappropriate standard by which to determine whether dredging is necessary.*

Port of Tacoma (1989)

See Response 5.1.2 — *A particular concern is the inadequacy of the data base for historic and current sources.*

See Response 6.4.1 — *[T]he FS overestimates the feasibility and effectiveness of source control measures.*

See Response 6.4.2 — *The FS establishes a goal of 60-95% control of all sources. It is not clear whether the 60-95% requirement will be additional to source control measures implemented since RI sampling in 1985 . . . [or] how the goal will be verified due to the lack of baseline data.*

See Response 8.4.1 — *The considerable costs of source control, monitoring, and future implementation are not included in the FS. . . The cost estimate of $28 million significantly underestimates the cost of implementing the preferred remedial action [which is estimated to be] three to four times greater than stated in the FS.*

See Response 3.3.1 — *[T]he FS' proposed cleanup goal for this Superfund site, unlike cleanup levels in other urban marine sites, requires the equivalent of pristine conditions. . . [the] proposed cleanup standards . . . are not attainable nor sustainable within Commencement Bay's urban setting.*

See Response 5.2.1 — *The FS performance standard does not acknowledge the impact of recontamination from continuing sources [including urban runoff].*

See Response 9.4.3 — *The relationship between [Ecology's] implementation of sediment impact zones and cleanup standards needs to be addressed.*

See Response 7.2.3 — *Use of the SEDCAM model (which has not been field tested) to predict future sediment conditions may have led to incorrect conclusions concerning the proposed remedial actions.*

See Response 1.2.1

The cleanup goal has been created in a vacuum and is premature. The Department of Ecology is obligated in the future to develope [sic] Puget Sound-wide sediment standards for regulating discharges and for determining when sediment remedial actions are necessary. Those regulatory actions should occur prior to the finalization of the FS, and certainly before the issuance of any Record of Decision.

Martinac Shipbuilding (1989)

See Response 2.1.1

While there does exist a problem to some degree, the implied threat to public health and the health of the marine environment has been grossly overstated.

See Response 3.3.1

What is an appropriate and achievable level of cleanliness for an urban, industrial waterfront area? There is a balance that must be struck between the adverse effects to the marine environment and the adverse effects to the people who work at the businesses and live in the community.

See Response 9.1.2

[W]e should seriously consider extending the time horizon allowed for natural recovery to occur. We are dealing with a 100 year old problem and in relative terms proposing to solve it overnight.

National Oceanic and Atmospheric Administration (1989)

See Response 1.3.4

The long-term goal of "no acute or chronic effects on biological resources" would be protective of NOAA trustee resources. [Because] cost and technical feasibility are factors that would be considered in the overall evaluation of actions . . . [the goal] may not be achieved in all areas under the Superfund cleanup.

See Response 3.3.2

The use of lowest AET values is probably the most appropriate general approach to setting target levels in Commencement Bay, even though the approach has not been fully developed. . . It is clear that AETs do represent concentrations that are associated with biological impacts. Thus it can be concluded that the AETs are clearly based on documented effects, but may easily underestimate the full range of injury that may be caused by toxic substances [e.g., chronic effects].

See Response 4.3.2

The possibility exists that combinations of two or more substances may result in greater toxicity than indicated by the individual AET values. In the case of Commencement BAy, however, the AETs are based on local data so that the last concern should not be a problem. In addition, the test procedures upon which the AET are based are probably the most reliable and may be among the most sensitive available. . . Finally, the AET approach provides a means of evaluating the need for remediation of sediments from deeper cores that may not be completely testable [using biological indicators].

See Response 9.1.2

The proposed 10-year "natural recover" period proposed in the FS presents some substantial problems . . . [because] Superfund legislation has only been authorized in increments of five years or less, with the strong implication that cleanup should be completed at many sites within that time frame . . . No justification is presented, nor is any analysis given, for the statement that a 10-year period presents an "optimal balance" between cleanup-associated disruption and the problems associated with the toxic

	substances [which by allowing] to continue will also continue to injure natural resources and threaten human health.
See Response 7.2.1 and 7.2.3	*[T]he change in concentrations in the surface sediments in most areas will be on the order of a factor of two after 10 years of "recovery." This level of change is on the order of the precision with which the concentrations of substances in the sediments can be reliably measured, and within the accuracy of the [SEDCAM] model. AS a result, the potential for error in meeting the cleanup goals if the recovery period calculation is allowed is large.*
See Response 9.2.3	*[I]t may be difficult to determine after 10 years that recovery has actually taken place. If not, will the PRP be allowed another 10 years to demonstrate that the process is working? [This] could lead to substantial failures to meet the cleanup goals.*
See Response 9.1.2	*While the PSWQA does include the recommendation that natural recovery be considered in cleanup action, it does not specify that 10 years should be used and the consideration does not necessarily apply to Superfund sites. In addition, the contamination at this site was identified and has been studies, with limited real action, for 10 years already.*
See Response 7.1.1	*Since [the natural recovery] process is limited to only the upper layer of contaminated sediments (upper 10 cm), any contamination in the deeper sediments will be unaffected. This process is therefore defacto in situ capping. In situ capping was rejected for all waterways except the St. Paul because of the high likelihood that the sediments in all of the other waterway would be dredged for maintenance or new construction.*
See Response 7.1.3	*The proposed "natural recovery" is simply a slow form of dilution. The same result could be achieved without the delay and uncertainty that would occur by allowing in situ capping. The recovery period sets a precedent of allowing dilution as part of a Superfund cleanup action. This approach has been clearly rejected at all other sites.*
See Response 1.1.1	*The FS is clear in recognizing that none of the confinement options meet the SARA preference for a permanent solution, as defined by reductions in the toxicity, mobility, or volume of the contamination.*
See Response 8.4.1	*[M]onitoring and maintaninance [sic] [of nearshore disposal sites] will have to perpetuated [sic] for centuries to come. It is questionable whether the costs of this long-term O&M have been fairly incorporated into the feasibility study, since it appears that only a 30-year period was used and for some sites, monitoring is costed for the first 10 years.*
Deferred	*In general, the [sampling and monitoring] guidelines are reasonably well thought out, but could be more specific with regard to the numbers of stations that may be needed.*
Deferred	*The bioassay recommendations are reasonable, but may well need to be revisited in the not-too-distant future as new bioassays are developed. . .*
Deferred	*The statement in the appendix [p. A-10 of the Integrated Action Plan] that the exceedance of a single chemical cleanup goal [in a marginally contaminated area] may be negotiable does not seem to be supported in the main body of the text. Since six of the nine problem areas have only two or [one] problem substances, this provision would seriously weaken the*

See Response 8.2.1	*[T]he FS does not identify feasible disposal sites for dredged material.*
See Response 8.5.1	*It will be difficult for businesses located at the CBNT site to adequately budget and plan for the future if critical aspects of the cleanup plan may be changed mid-course.*
See Response 4.2.1 and 1.2.2	*AETs may be useful as predictive tools for the PSDDA program . . . [but not for] determining that a particular sediment should be remediated. . . Nevertheless, the FS still cites PSDDA as a justification for using AETs for cleanups. Given the different goals, the citation is inappropriate.*
See Response 8.4.2	*The FS admits that its area and volume estimates are based on multiple assumptions and are not likely to be accurate. . . FS decisions on remedial action alternatives are not appropriately based on such weak information.*
See Response 8.5.2 and 8.2.9	*The FS does not adequately justify nearshore disposal over confined aquatic disposal ("CAD") for the HHW [Head of Hylebos Waterway].*
See Response 9.2.2	*The comments of Kaiser and the CBG alone are far reaching (as necessitated by the complexity and size of the Site) and cannot truly be adequately addressed and responded to in just a few months [i.e., by summer or early fall of 1989].*
See Response 8.5.1	*. . . the agencies must not [in a performance based ROD] place the burden of meeting a certain cleanup standard on the PRPs unless at least one alternative is identified that both meets the standard and meets CERCLA's requirements regarding effectiveness, implementability, and cost.*
See Response 1.1.6	*Considering [urban runoff, historic sources, and NPDES-permitted discharges exempt from CERCLA coverage], the Superfund should be tapped to pay for a least a portion of the remediation costs at Commencement Bay.*
Comment noted	*Kaiser agrees that there are no feasible or cost effective treatment alternatives available for the large quantities of dilute contaminants present in Commencement Bay sediments.*
See Response 1.1.3	*A single Superfund action is not an appropriate way to address such a large and varied area. If anything, dozens of smaller sites should have been listed instead of one huge site.*
See Background Section	*In general the study of the CBNT Site process was compromised by not soliciting input from industry -- the parties who should know the most about what is feasible at the Site. The agencies should now embark on a program to correct the misconceptions regarding Commencement Bay.*

Louisiana-Pacific Corporation (1989)

See Response 7.2.3	*The SEDCAM model needs to account for arsenic losses from sediments. . . . Site-specific studies of arsenic fluxes from areas proposed for cleanup should be conducted . . . [and] used in evaluating whether natural sediment recovery is feasible for areas currently proposed for cleanup.*

See Response 5.1.2 and 6.1.1	*The FS does not accurately characterize arsenic sources and loadings into the head of the Hylebos. . . Sources contributing to Hylebos Creek must be curtailed before any cleanup of sediments . . . since Hylebos Creek is the largest contributor of arsenic in this immediate area.*
Deferred	*The priority rankings in the Integrated Action Plan do not reflect actual contributions of arsenic. . . Parties should not be given lower priority on the grounds that they are recalcitrant.*
See Response 6.4.1 and 6.4.2	*The evaluation of source control technologies in the FS does not provide sufficient consideration of factors encountered at log sort yards and wood waste landfills to hold that the technologies are feasible at log sort yards.*

Manke Lumber Company (1989)

See Response 9.2.1 5.2.1 and 5.1.2	*The implementation schedule suggested by the Feasibility Study (FS) creates a substantial likelihood of recontamination of remediated sediments [because] . . . many of the potential sources of contamination have not been identified . . . a number of [identified sources of contamination] have not yet been controlled . . . there is inadequate data with respect to many, if not most, point and non-point sources of contamination.*
See Response 7.1.2	*The natural recovery of the sediments should be the preferred remedial alternative, and should be abandoned only if absolutely necessary.*
See Response 8.3.1 and 1.1.7	*A dredge and fill operation would further destroy present biological communities . . . [and] would create secondary contamination problems at the site of disposal, contrary to the present Super Fund Policy to remediate contaminants on site.*
See Response 7.2.3	*The sedimentation rate estimated in the FS is based upon assumptions with out adequate data, and may well be understated.*
See Response 3.3.1	*. . . the goal of . . . "no adverse effects" . . . is not obtainable in an urban environment. . . Commencement Bay and its waterways cannot be returned to the pristine state they were in before man came to the Commencement Bay area.*
See Response 4.4.2	*A more realistic goal in an urban environment is no significant effect on biological resources.*
See Response 2.1.4	*The process by which health risks are estimated . . . is grossly exaggerated [sic]. The FS contains assumptions as to consumption of fish and fish livers which have no basis in fact.*
See Response 4.1.1	*[T]he AETs are faulty in as much as they do not establish a cause and effect relationship between contaminants and biological responses*
See Response 4.3.1	*[T]he AETs are faulty in as much as . . . they do not distinguish between adverse and nonadverse effects.*
See Response 4.3.2	*[T]he AETs are faulty in as much as . . . they do not quantify the extent of adverse effects.*
See Response 8.2.1	*The availability of disposal sites should be confirmed before the FS process is completed so that factor of cost effectiveness can adequately be addressed in the remedial action selection process.*

See Response 8.2.10	*We request that . . . EPA change its preferred alternative for the head of the Hylebos Waterway to source control with natural recovery or, in the alternative, if EPA re-analyzes its alternatives, to remove PCBs as an indicator chemical.*
See Response 5.1.1	*EPA's characterization of sources of PCBs is inadequate to support remedial action or to identify sources.*
See Response 8.5.1 8.4.1 and 1.1.1	*EPA has not shown that the Agency's preferred alternative for the head of Hylebos Waterway is cost effective. . . First, the cost analysis is extremely inaccurate. Second, the plan is not reliable. Third, the plan does not adequately provide long term or permanent solutions to the contamination problems at the site.*

Griffin Galbraith Fuel (1989)

See Response 6.1.1	*Stopping all source and non source pollution should be our first priority.*
See Response 9.1.2	*After the sources of pollution are stopped we should give nature sufficient time to remediate the pollution. . . [T]wenty to twenty five years should be given for natural remediation.*
See Response 7.1.3	*Save dredging for those truly "Hot Spots," after source control, to disturb and spread the contaminated sediments as little as possible.*
See Response 8.5.3 8.2.1 and 8.4.1	*A current cost-benefit analysis should be performed based on disposal sites and contracting costs available today. . . the sites used in the Tetra Tech study may not be practical solutions or will not be available.*
See Response 3.3.1	*One ex-director of the EPA stated that in some cases the agency clean up demands are for a more pristine state than occur in nature. We cannot overlook the fact that Commencement Bay is an industrial and population center. We need cleanup goals that are achievable with not eliminating people and their livelihood from the area.*
Deferred	*Since it is estimated that I-5 contributes about 40% of the Commencement Bay pollution, the Department of Transportation and the State of Washington should be listed as Potentially Responsible Parties.*

Jones Chemicals, Inc. (1989)

See Response 3.3.1	*This site is a large working port, and has been an industrial area for 100 years. It is not realistic to believe that it can or should be restored to pristine conditions.*
See Response 1.3.1 and 1.1.2	*The goal of "no acute or chronic adverse effects" on marine organisms is not required by any applicable law and should not be adopted as the goal for cleanup . . . the plan as proposed could require continuous cleanup efforts to try to reach an unattainable goal.*
See Response 8.4.1 and 8.5.3	*EPA's estimate [for costs at Superfund sites] is always below the actual cost often by [two] or more. In addition, this cost does not include any of the costs of source control, which are a key part of the Integrated Action Plan. EPA is therefore contemplating a societal cost regardless of who actually pays . . . tens of millions of dollars. More consideration*

should be given to whether the benefits to the environment and indirectly to human health justify that level of investment of society's resources.

See Response 8.2.1 — *Perhaps the most important [specific problems with the plan] is the lack of any suitable disposal site for dredged material which is proposed for "nearshore disposal."*

See Response 9.1.2 — *EPA should reconsider allowing more time for natural recovery, coupled with institutional controls, to work before any dredging occurs.*

See Response 8.5.2 — *If dredging is necessary, the material should be disposed of using confined aquatic disposal for all areas within the site. According to EPA's figures, aquatic disposal is about 1/3 the cost of nearshore disposal and is much more likely to be feasible, given the lack of nearshore disposal sites.*

See above Responses — *In short, we support the following cleanup plan for the Nearshore/Tideflats site: aggressive source control to eliminate continuing sources of contamination, followed by a period of natural recovery. There is no reason why this period should be limited to 10 years if monitoring shows it is making satisfactory progress. Dredging should be a last resort if natural recovery is not making headway.*

Kaiser Aluminum and Chemical Corporation (1989)

See Response 6.1.1, 9.1.1, 6.3.1 and 9.2.1 — *Effective control of all significant sources must occur before [undertaking] remedial action. . . the FS [has not] adequately identified potential sources, characterized sources [including non-industrial sources], or determined source loadings of contaminants to Commencement Bay. . . [and] timetables for remedial action do not give adequate allowance for the completion of source control. . .*

See Response 3.2.1 and 4.4.2 — *[T]he goal for the cleanup [should] be defined based on what is necessary to protect human health and the environment from significant adverse impacts . . . cleanup should only be required in areas where an ecologically significant (not statistically significant) benefit can be shown.*

See Response 7.1.2 — *[N]atural recovery [should] be the preferred cleanup alternative except in cases where it plainly will not protect human health and the environment in the long term. . . It does not disrupt the existing ecosystem or resuspend sediments. . . [and] is appropriate for an urban bay which has received contaminants for many years from many historic sources.*

See Response 8.3.1 — *The negative impacts of dredging are not adequately considered in the Feasibility Study and supporting documents. . . [dredging] should not be used . . . where the impacts exceed the environmental benefits of remediation.*

See Response 9.1.2 — *In the FS, the selection of ten years as an appropriate natural recovery period appears to be arbitrary. . . [the reasons cited do not] explain why a longer period is not preferable. . . the long-term goal of "no impact" was intended by the [Puget Sound] Plan to be much longer than a ten year period.*

See Response 8.4.1 — *[T]he costs of the preferred remedial alternatives are greatly underestimated in the FS. In addition, the costs of source control . . . and monitoring costs were not included. . .*

See Response 1.2.1 — *The Department agrees that the long term goal as translated into the AET values stated . . . in the Feasibility Study is appropriate and that the actual decision can be refined through additional biological analysis. . .The utilization of performance criteria is very appropriate. . .*

See Response 8.4.2 — *The volume of sediment proposed for dredging has not been adequately determined even in a general way*

See Response 8.2.1 — *The volume capacity of the nearshore fill and the CAD sites is probably significantly less than proposed.*

(Plus additional specific comments.)

DOT (1989)

Deferred — *Based on [information attached], WSDOT [requests to] be removed from [the CB/NT site] PRP list. . . [and requests a written response as to] why WSDOT was not sent even a general notice letter until April 24, 1989, well into the comment period on the RI/FS and at least five years into the RI/FS process.*

Dunlap Towing Company (1989)

See Response 5.2.4 — *First it must be recognized that Commencement Bay is an urban estuary with a large drainage basin. Not only are there industrial pollutants entering the Bay, but contaminants from automobiles, farms and storm drains also run off into its waters.*

Deferred — *Some of [the fish in Commencement Bay] display abnormalities, the sources of which have not been identified for certain, however, they are the type of tumors and lesions that are generally found in fish from waters that have been contaminated with residues from non-point pollution sources such as automobile exhaust and pesticides as well as chemical manufacturing sources.*

See Response 3.3.1 — *The goal of "no adverse affects" is inappropriate and would have a severe negative impact on one of the nations most active ports.*

See Response 8.4.1 — *The costs of the remedial alternatives in the Feasibility Study are grossly understated and have been projected to be as much as three times these estimates.*

See Response 8.5.3 — *The Feasibility Study does not adequately justify the costs of dredging compared to the minimal measurable environmental benefit it will provide.*

See Response 5.2.1 and 6.1.1 — *The priority for cleanup of Commencement Bay should be the control of the sources of pollution (both point and non-point). . . Dredging should not be considered until source control and a monitored period of natural recovery have been completed.*

Foss Maritime Company (1989)

See Response 8.5.1 — *Foss supports attempts to develop a cost-effective cleanup plan that is reasonable and appropriate under the circumstances present in Commencement Bay.*

See Response 3.3.1	*[W]e question whether the long-term cleanup goal of no adverse effects on marine life is appropriate for an urban bay, a working port, and a developing economy.*
See Response 5.2.1 and 9.1.1	*Control of airborne emissions and surface runoff from highways, storm drains, farms, construction activities, an other [non-point] sources simply may not be sufficient to support a goal of "no adverse effects."*
See Response 5.1.2	*We believe [the FS] focus on ship building and repair activities as the source of copper and mercury in Middle Waterway is speculative. . .Other possible sources, such as nearby industries and storm drains in the Waterway, have not been considered thoroughly. . .[and] sampling conducted to date is not sufficient to provide a clear picture of contaminant distribution in the Waterway.*
See Response 4.1.1	*[I]t does not follow that observed concentrations of [copper and mercury] should be the basis for cleanup decisions. The AET approach to sediment quality does not establish causality between a particular contaminant and a biological impact. . . Numerous studies, including ongoing work at the Asarco smelter in Tacoma, indicate that the metals in slag may not be generally bioavailable.*
See Response 8.4.2	*The volume of contaminated sediments quoted in the FS (57,000 cubic yards) is likely underestimated [in Middle Waterway]. This volume assumes a 1.5 foot cut . . . more likely, however, a 2 to 3 foot cut would be used . . .*
See Response 8.2.3	*Disposal of the [Middle Waterway] sediments in Slip 1 near the mouth of the Blair Waterway may not be feasible [because of an unsuited filing] schedule, . . . [difficulties in defining and apportioning] responsibilities for monitoring . . .the capacity of Slip 1 may be overstated in the FS . . [and] alternative sites for nearshore sills may be available close to Middle Waterway.*
See Response 8.4.1	*Costs presented in Appendix D of the FS appear low by a factor of two or more. Specifically, the estimated costs listed for dike construction ($0.51/cubic yard) should be more in the range of $8 to $12/cubic yard of dike, while the estimated costs for monitoring wells ($2,000/well) should be closer to $5,000/well. Despite the overall underestimate of cleanup costs, however, the relative cost ranking of cleanup alternatives is likely valid.*
Deferred	*Clamshell dredging and nearshore disposal appears to be a desirable alternative . . . [and] [a]ssuming cleanup of the Waterway is warranted, this recommendation appears appropriate for the reasons stated in the FS.*

General Metals (1989)

See Response 1.1.3	*EPA's proposed remedy for the head of the Hylebos problem area is not appropriate or consistent with the National Contingency Plan.*
See Response 4.1.1	*Remedial action consistent with CERCLA's "Protection of Human Health and the Environment" standards does not require dredging to meet AET levels. . . Dredging is not needed to meet ARARs. The AET level for PCBs is not needed to assure protection of human health. EPA is without the authority to compel the PRPs to dredge as part of remedial action in these circumstances.*

[as the Feasibility Study]: ignores dredging and disposal impacts; uses the SEDCAM model that underestimates the rate of natural recovery; does not consider the benefits to be derived from using a natural recovery goal greater than 10 years; proposes an inadequate biological testing program. These short comings . . . should be remedied before any actions are undertaken.

(Plus additional comments following summary comments.)

Commencement Bay Group (1989) [also cited as ENSR (1989)]

See Response 5.1.2, 6.4.1 and 6.4.2

The RI did not identify and quantify contaminant sources in sufficient detail to allow reliable estimates of current contaminant loadings and achieveable source control. Because of inadequate source characterization, the source loading and source control estimates made in the FS are based on technically unsupportable assumptions. These estimates of two of the most fundamental elements of site clean-up, are highly uncertain and are likely to be in error [detailed discussion in Chapter 4 of the ENSR report].

See Response 2.1.1

The FS over-estimated the human health risks in Commencement Bay by nearly an order of magnitude. This lower risk is within the generally acceptable range and is comparable to the risk reported in the FS for Carr Inlet the (the reference area) [sic]. This indicates that sediment clean-up based on human health risk is not warranted in Commencement Bay [detailed discussion in Chapter 3 of the ENSR report].

See Response 3.3.1

The sediment clean-up objective, "no acute or chronic adverse effects on biological resources", using Apparent Effects Thresholds (AETs) as the clean-up standard, is not attainable sustainable [sic] in Commencement Bay. This goal defines pristine conditions. Commencement Bay is an active port and industrial area which cna [sic] never achieve pristine conditions. Prop wash, maintenance dredging and other urban activities will prevent the pristine goal from being achieved. There is insufficient source characterization information to predict attainment and maintenance of the AETs without repeated dredging and disposal. An achievable and sustainable sediment clean-up objective and standard should be established before implementing sediment remediation [detailed discussion in Chapter 1 of the ENSR report]

See Response 4.1.1

AET's fail to establish cause and effect relationships between contaminants and biological responses.

See Response 4.2.1

The long term sediment clean-up standard (AETs) can be a useful indicator of potential adverse effects, but is not an appropriate clean-up standard or proper measure of clean-up effectiveness [because of the following three comments on AET]. . . These flaws severely restrict the use of AETs as a clean-up standard. [detailed discussion in Chapter 2 of the ENSR report]

See Response 4.3.1

[AET fail to] differentiate between adverse and non-adverse effects.

See Response 4.3.2

[AET fail to] quantify the extent of adverse affects [sic].

See Response 7.2.3

The sediment recovery model (SEDCAM) can be useful as an indicator of the relative rate of natural recovery but is not an appropriate tool for making major program decisions. Insufficient and unreliable model input data from Commencement Bay has resulted in recovery time predictions that may be several times longer than actual recovery times. Sediment recovery

is best estimated by monitoring actual recovery following source control [detailed discussion in Chapter 5 of the ENSR report]

See Response 8.2.1 through 8.2.8

The FS failed to identify feasible and cost-effective response actions for most waterways. Most alternatives identified and evaluated in the FS including the preferred alternatives can not be implemented because of the lack of sufficient disposal capacity. [detailed discussion in Chapter 6 of the ENSR report]

See Response 3.3.1, 7.1.3, 6.1.1, 8.2.1, 8.4.1, 2.1.1, 4.3.1 and 3.1.1

Our basic concerns about the proposed cleanup plan include [are summarized as follows] . . . The cleanup goal for Commencement Bay should be realistically based on the present and future uses of the Bay. . . Natural remediation is an effective way to address this historical process, coupled with continuing efforts to "turn off the spigot" on ongoing pollution sources. . . Source controls should be implemented first, and their effectiveness measured, before any remedial dredging occurs. . . The Feasibility Study does not identify feasible and cost-effective response actions for most waterways because it fails to identify available disposal sites. . . and because it greatly underestimates remedial costs. . . Commencement Bay sediments do not pose a significant human health risk. . . AET . . . does not provide an appropriate cleanup standard . . . The AET approach also targets some sediments for active remediation where there may be thriving ecological communities. . .

Deferred

The no-effect station setting an AET may appear to satisfy the definition of AET simply because the sampling was truncated in the midst of a series of sporadic effect stations at a point where the highest concentration happened to be an adverse biological effect station. There should be some assessment as to whether the AET value is likely to be solely the result of sporadic effects rather than consistent adverse effects above the AET.

(Plus additional comments in sections of the ENSR report.)

DNR (1989)

See Response 9.4.3

[T]he FS [should] address: 1) How the decision to require (or not require a SIZ [sediment impact zone] will be made; 2) What technical bases are to be used to define the area of a SIZ; 3) What effect will a SIZ have on the long term timing of sediment remedial actions; 4) What monitoring of a SIZ will be required; 5) What long term remedial actions will be required where a SIZ is established; 6) What parties will be responsible for monitoring and, in essence, stand behind the SIZ.

See Response 9.5.5

Any CAD [site] would be an experiment and require more compliance and environmental monitoring than what has been identified in the FS cost analysis.

See Response 8.2.5

At the current time the Department of Natural Resources acting for the State of Washington in terms of aquatic land ownership does not approve of CAD sites because of the issue of monitoring and technical feasibility. . [and] liability. . . The feasibility of the CAD site is questionable.

See Response 4.1.1

The Department agrees with the basis premise that the AET method is the best method available at the present time to identify sediments requiring remedial action.

Information noted — *[The St. Paul] project was completed under Ecology supervision and with EPA being kept fully informed of the nature of the project and its progress . . . [the] Consent Decree . . . provides, among other things, for long-term maintenance and monitoring.*

Information noted — *The Tacoma kraft mill was acquired by Champion as a result of the merger of St. Regis Paper Company into Champion.*

Information noted — *The activities described in the subsection entitled "Sediment Remediation and Habitat Restoration" have been completed and approved by Ecology.*

Request noted — *The administrative record for this FS should include the Consent Decree [for the St. Paul Waterway area].*

Request noted — *Champion agrees with the comments of the Commencement Bay Group [and] urges EPA to seriously consider those comments in connection with the ROD.*

Citizen Letters (1989) (See Background on Community Involvement section)

City of Tacoma (1989)

See Response 3.3.1 — *[T]hese efforts [to facilitate a cleanup plan] must be cost-effective and focused on achievable goals that accommodate the valuable commercial and industrial activity surrounding Commencement Bay.*

See Response 4.3.1 and 3.1.1 — *The Apparent Effects Threshold (AET) does not provide an appropriate cleanup standard because it does not adequately differentiate between effects caused by individual chemical contaminants and effects caused by other factors. The proposed AET-based standard also targets some sediments for active remediation where there are thriving ecological communities.*

See Response 7.2.2 — *We concur with the Feasibility Study that ongoing sources of contamination must be curtailed before any remedial dredging occurs, and support the concept of natural sediment recovery. However, we conclude that the criteria defining areas allowed to recover naturally are too restrictive . . .*

See Response 7.2.4 — *An error was made in applying the sediment recovery model at the Head of City Waterway. A recalculation of the model using the correct data from the Feasibility Study indicated that most of the waterway will recover naturally if source controls are implemented. The dredge boundaries proposed in the Feasibility Study would result in needless costs and disruption of biological communities at both the dredge and disposal sites.*

See Response 8.2.1 through 8.2.8 — *The Feasibility Study does not identify feasible and cost effective response actions for most waterways because it fails to identify available disposal sites for the quantities of materials proposed for dredging . . .*

See Response 8.4.1 — *The Feasibility Study does not identify feasible and cost effective response actions for most waterways . . . because it greatly underestimates remediation costs. The cleanup plan proposed in the Feasibility STudy for $28 million could cost in excess of $100 million to implement.*

See Response 2.1.1 — *Commencement Bay sediments do not pose a significant human health risk. The actual health risks from Commencement Bay sediments are similar to*

	The actual health risks from Commencement Bay sediments are similar to those reported for Carr Inlet and other non-urbanized Puget Sound waterways, and are within the range of risks that EPA has considered acceptable in other situations.
See Response 6.5.1	*The first element of the cleanup plan to proceed with is implementation of source controls. The City of Tacoma has already initiated a program to identify and remove existing sources of contamination from municipal storm drains, and we are also studying the feasibility of treating storm run-off entering the Head of City Waterway.*
See Response 4.4.2	*In recognition of the AET and sediment recovery model limitations, we suggest that only sediments with concentrations clearly exhibiting benthic toxicity be remediated immediately, in order to take full advantage of natural recovery.*
See Response 3.2.1 and 3.2.2	*Biological criteria used to define dredging boundaries must be based on analyses of the resident benthic communities. These analyses should be of sufficient detail to differentiate toxic effects from other site specific or environmental effects.*
See Response 9.5.4	*In areas not clearly exhibiting benthic toxicity, sediment concentrations and biological recovery [should] be monitored at 5 and 10 years following completion of source controls. Sediments not meeting the long-term cleanup goal after 10 years [should not] be remediated.*
Request noted	*We suggest that the U.S. Environmental Protection Agency and the Washington Department of Ecology open a local office for their joint use. We further suggest that the local site managers be assigned full-time at that office.*

City of Tacoma (1989); Attachment A—Review of 10.0 Head of City Waterway

See Response 5.3.1 and 5.1.2	*The Feasibility Study overestimates mass loadings for most sources . . . [and] has not adequately evaluated the nature and extent of [sources within drainage basins] based on our more extensive information.*
See Response 7.2.1 through 7.2.4	*The SEDCAM model, as used in the Feasibility Study, overestimated the time required for natural recovery of City Waterway sediments. This overestimate of the time required for natural recovery is the result of erroneous assumptions.*
See Response 8.4.1	*The estimated costs of sediment remediation are seriously underestimated by the Feasibility Study.*
See Response 6.2.1	*The Feasibility Study proposes infeasible end-of-pipe source control measures.*
Request noted	*The "Environmental Significance" rating for the head of City Waterway should be "low" rather than "medium."*

(Plus additional comments following summary comments.)

City of Tacoma (1989); Attachment C—Review of Commencement Bay Integrated Action Plan

See Response 1.2.4	*The Integrated Action Plan . . . suffers from the same reliance on AETs*

IV. REMAINING ISSUES

Some issues and concerns were raised that were not germane to the selection of remedy but which do warrant consideration by the agencies. These issues are marked as "Deferred" and will be considered and factored into remedial design and action. These issues and concerns included:

1. Incorporation of new information developed post-record of decision as described in Section 10.3 of the Record of Decision and briefly discussed in the response to Comment 5.1.3

2. Success of future source control and the impact on remedial action plans; the success of source control will be monitored and adequate source control will be required before sediment remedial action begins

3. Future public input to the integrated action plan, which will be through participation in the Technical Discussion Group and public comment periods on individual consent decrees that implement specific cleanup plans

4. ASARCO's comments specific to sediments in the Ruston-Pt. Defiance problem area, which will be considered public comments for the new ASARCO sediments operable unit

5. Other detailed comments that are relevant to remedial design considerations (i.e., specific comments on the area, volume, and characteristics of contaminated sediments); these comments were not relevant to the selection of remedy but will be further considered at the start of remedial design.

V. ANNOTATED BIBLIOGRAPHY

Comments abstracted from materials submitted by citizens, and representatives of various agencies, PRPs, and citizen groups are summarized in this section. Additional detailed comments were submitted during the comment period as part of major documents, such as ENSR (1989), Kaiser Aluminum and Chemical Corporation (1989), Pennwalt Corporation (1989), Puyallup Tribe of Indians (1989), and ASARCO (1989). These comments were considered in developing responses to the major summary comments that were identified in these reports and listed in this section.

AOL Express, Inc. (1989)

See Response 3.3.1

[W]e feel it is important that consideration be given to the level of cleanup, taking into account the multiple use nature of the area and the importance of a healthy local economy.

See Response 6.1.1 and 8.2.1

We feel that with effective source control monitoring and the availability of an adjacent disposal site, a reasonable and cost-effective remedy can be achieved.

Deferred

The public storm drains in our area drain into the "Blair" waterway, a site not designated for any cleanup action...we support [the position to have "responsible parties" do the cleanup], but strongly maintain that we are not a responsible party [in the Hylebos Waterway]. The best way to deal equitably with the smaller business who is demonstratively not involved in pollution of the waterway is to enter into immediate negotiations for release either by outright dismissal or deminimis settlement.

ASARCO (1989)

See Response 1.1.3

The Feasibility Study has failed to comply with the NCP in that it is too broad [comprising the entire bay] and is based upon inadequate data [for any given segment of the bay]. Based upon the [recent] findings of [the Tacoma Smelter site RI/FS], EPA should withdraw in its entirety that portion of the Commencement Bay FS dealing with the area offshore of the Tacoma smelter and should revise the FS based upon the data.

See Response 3.3.1

The Feasibility Study is based upon an improper remedial action goal . . . the sediment quality goal, "no acute or chronic adverse effects on biological resources or significant health risk to humans" . . . is unconnected with any requirement of CERCLA and is not mandated by any ARAR . . . [the goal] far exceeds CERCLA's goal of protecting the environment . . . and is not attainable [as a clean up objective. A goal of sediment quality that supports a properly functioning in situ benthic community and does not pose a significant risk to human health, is attainable and much more in keeping with the stated statutory objectives of CERCLA.

See Response 6.1.1 and 6.3.1

Appropriate source control should be undertaken and achieved before any offshore remedial action.

See Response 7.2.3

The impact of natural recovery processes have been greatly underestimated by Tetra Tech. Once onshore source control has been attained [at the Asarco Tacoma Smelter], it is highly likely that physical removal of contaminated

sediments by currents and wave action will be achieved. This activity was not properly considered by the FS.

See Response 1.1.5 — *The FS has failed to take into consideration the fact that much of the contamination targeted for remedial action [at the Asarco Tacoma Smelter] is a result of a "federally permitted release" and therefore not actionable under CERCLA. . . At a minimum, the FS should consider the impact of federally permitted releases and exclude contamination from such releases from any remedial action recommended or set up the proper method for crediting the PRP for such releases.*

See Response 8.3.1 — *The FS alternative for the area offshore of the Asarco Tacoma Smelter is contrary to the objectives of CERCLA [because it . . .] contains a healthy, and in some cases, very unique benthic community . . . extensive dredging is not only unnecessary, but would itself adversely impact the environment through total destruction of health benthic communities.*

[Numerous specific comments followed in the comment letter that pertained to the Asarco Tacoma Smelter site; attachments included a "Review of Commencement Bay Feasibility Study" by Parametrix, Inc. and Black & Veatch, "review of Commencement Bay Integrated Action Plan" by Parametrix, Inc., "Review of 13.0 Ruston-Pt. Defiance Shoreline Commencement Bay Feasibility Study" by Parametrix, Inc., and "Technical Review of the Apparent Effects Threshold Approach" by Tetra Tech, Inc., and the "Asarco Tacoma Smelter Remedial Investigation" by Parametrix, Inc. (1989).]

American Savings Bank (1989)

Deferred — *[O]bjects to its designation as a potentially responsible party . . . [and] reserves the right to comment further when [the Proposed Plan] is completed.*

Buffelen Woodworking Company (1989)

See Response 6.1.1 and 6.3.1 — *We agree with EPA that the priority should be to work with the responsible parties to ensure that source control is complete before starting sediment remediation.*

See Response 8.2.3 — *The EPA should consider alternatives to the Port of Tacoma Slip #1 on the Blair Waterway. Comments . . . indicate that the Port needs the use of this site before clean-up can reasonably expect to be completed.*

See Response 1.1.6 — *We disagree with the method the EPA has for assessing costs against the PRP's as an aggregate group rather than on an individual basis. This method can result in the PRP with the most effective attorney being responsible for the smallest percentage of the cost. . .*

Champion International (1989)

See Response 8.2.7 — *In view of the fact that [the clean-up of St. Paul Waterway as outlined in the Consent Decree] has been completed and has been judged to be successful, Champion urges EPA to accept the project as completed in the ROD for the Commencement Bay site. Champion agrees with the FS conclusion as set forth in [Section 8.6] that in situ capping of the problem area of St. Paul Waterway is the preferred alternative. The ROD should accept this recommendation.*

APPENDIX C

Implementation Schedules for Source Control and Sediment Remedial Action

Community relations activities have been conducted by Ecology and EPA with assistance from TPCHD. This list refers specifically to Nearshore/Tideflats and *Areawide* activities. It does not include activities specific to ASARCO, Tar Pits, and South Tacoma Channel sites. Community relations activities include the following

- Prepared the initial community relations plan (1983)
- Established and provided staff support for Citizens Advisory Committee [started in September 1983 with regular meetings ongoing through spring (1989)]
- Established and maintained information repositories (1983-present)
- Developed and maintained mailing list of interested individuals (1983-present)
- Periodically briefed Tacoma-Pierce County Board of Health and city/county government officials
- Provided information for working sessions with Pierce County Medical Society (1983)
- Gave presentations to elementary and high school students, to workshops for teachers (winter 1986), and to schools and community groups (1983-1986)
- Held press conference and gave tours of Commencement Bay (June 1984)
- Gave tours of Commencement Bay to the Citizens Advisory Committee (1984, August 1988) and student groups (June 1986)
- Distributed periodic Commencement Bay Superfund updates to the community (September 1986, April 1987, August 1987, March 1988, May 1988, April 1989, September 1989)
- Gave 27 community interviews for revised community relations plan (September 1987)
- Published notice and analysis of proposed plan in Tacoma News Tribune (24 February 1989)
- Distributed proposed plan fact sheet to over 2,500 individuals (24 February 1989)
- Presented public workshops, meetings, and hearings:

NOAA report, TPCHD fish advisory	April 1981
Cleanup plans	June 1983
Progress report	March 1984
Remedial investigation study plan	November 1984
Commencement Bay dredging disposal	September 1985
Remedial investigation results	June 1985
Remedial investigation results and comments	July 1985
Status report	November 1985
Tideflats businesses (business liability)	April 1989
Proposed plan	21 March 1989
Proposed plan and public comments	6 June 1989

- Provided briefing for public officials and members of the press (February 1989).

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IMPLEMENTATION SCHEDULES FOR SOURCE CONTROL AND SEDIMENT REMEDIAL ACTION

In this appendix, recent, ongoing, and planned activities are summarized for the major problem areas of the Commencement Bay Nearshore/Tideflats (CB/NT) Superfund site. Timelines depict major actions pertaining to the characterization and remediation of sources and adjacent sediments from 1987 to 1995. Details of source-related actions are provided in the supporting text.

The information contained in this section, particularly regarding the nature and timing of future actions, is tentative and was developed for planning purposes. The timing of source control actions is highly dependent upon the availability of agency staff and financial resources, the success of negotiations with potentially responsible parties (PRPs), and source control and investigation results

Identification of additional sources will be supported by Urban Bay Action Team (UBAT) activities. The 1989 Puget Sound Water Quality Authority plan (PSWQA 1988) requires that action teams carry out various source control and investigative actions, including searches for unpermitted discharges, investigations of storm drain and groundwater contamination, and regulatory enforcement. The timing of sediment remedial actions is dependent upon the priority ranking of the problem area, the successful implementation of source control actions, negotiations with PRPs, the successful completion of the remedial design phase, and necessary coordination of remedial action with activities conducted in other problem areas. Because of these complicating factors, the timing of sediment remedial activities is subject to the greatest uncertainties. The schedules for source control and remedial activities reflect the status of those activities as of July 1989.

Remedial activities associated with storm drains in each of the problem areas will be regulated by the new National Pollutant Discharge Elimination System (NPDES) permit regulations to be adopted early in 1990. NPDES permit applications for industrial storm drains will be due 1 year later. NPDES permit applications for municipal storm drains will be due 4 February 1992. In addition, the 1989 PSWQA plan (PSWQA 1988) requires that local governments begin developing stormwater programs by 31 December 1989 and demonstrate significant progress on the programs by 31 December 1991. By the year 2000 the stormwater programs must be implemented.

HEAD OF HYLEBOS WATERWAY

Remedial activities at the Head of Hylebos Waterway are summarized in Figure C-1. Numerous sources have been associated with sediment contamination at the head of the waterway, including Pennwalt Chemical Corporation; Kaiser Aluminum and Chemical Corporation; General Metals, Inc.; several log sorting yards, and the landfills in the Hylebos Creek drainage basin. The locations of existing industries in Hylebos Waterway are shown in Figure C-2.

In the last several years, Kaiser Aluminum has implemented several remedial actions. These actions include re-routing of in-plant wastewater streams, installation of a settling basin between an NPDES-permitted discharge and Kaiser Ditch, and installation of a tide gate in Kaiser Ditch. Remaining scrubber sludges on the western portion of the site are addressed in the Sludge Management Closure Plan, submitted to the Washington Department of Ecology (Ecology) in September 1987, which proposed in-place capping as the preferred remedial action. Ecology has required additional groundwater monitoring and soil testing, as well as a risk assessment to determine whether the remaining scrubber brushes will need to be removed or if they can be disposed of onsite. A consent decree is in the draft negotiation stage and should be completed in January 1990. It is anticipated that site stabilization activities will be performed during the summer of 1990 and require less than 6 months to complete. The effluent from Kaiser Aluminum is monitored under an NPDES permit, which is due for renewal in November 1989.

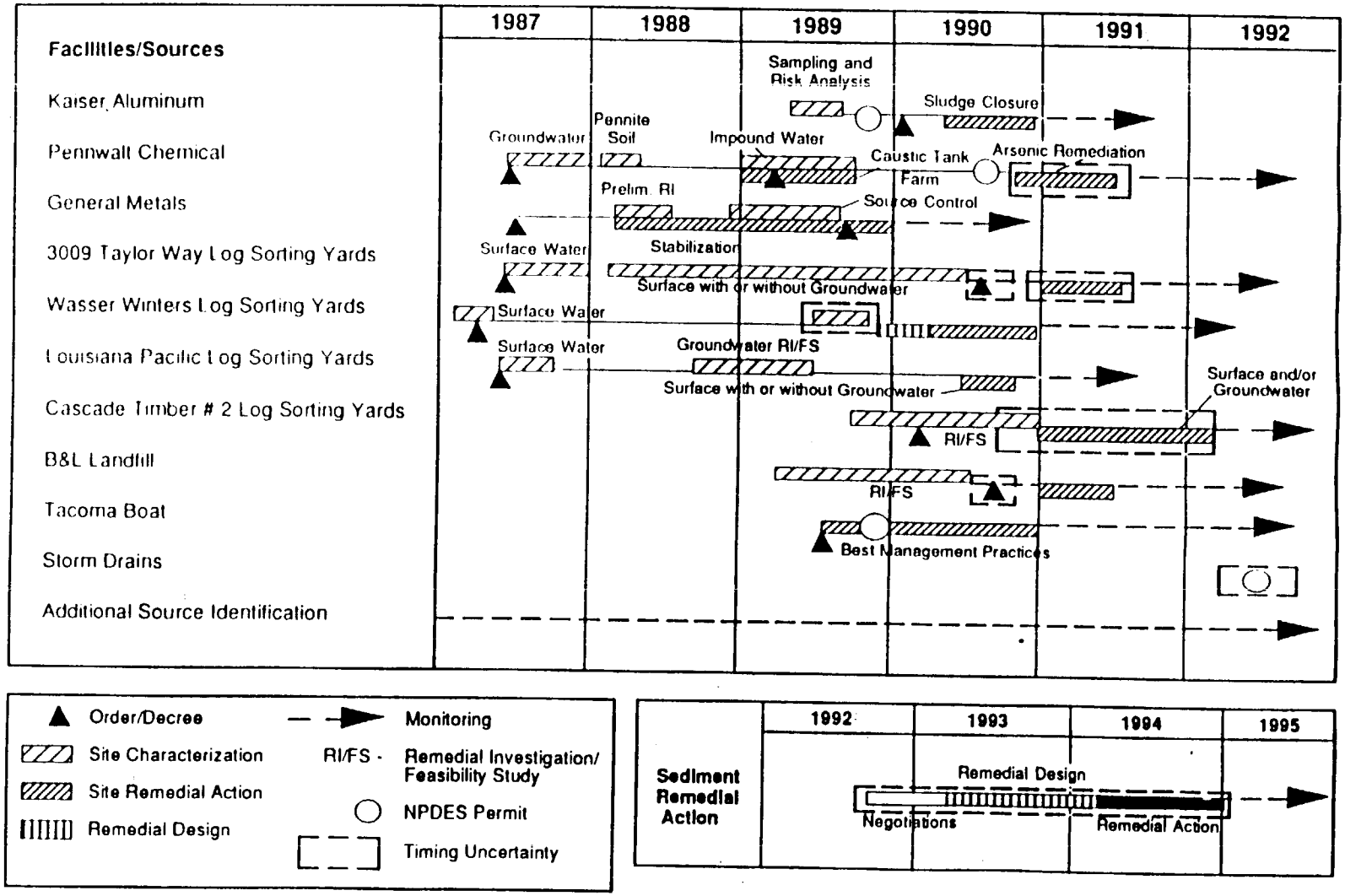


Figure C-1. Recent, ongoing, and planned activities at the Head of Hylebos Waterway

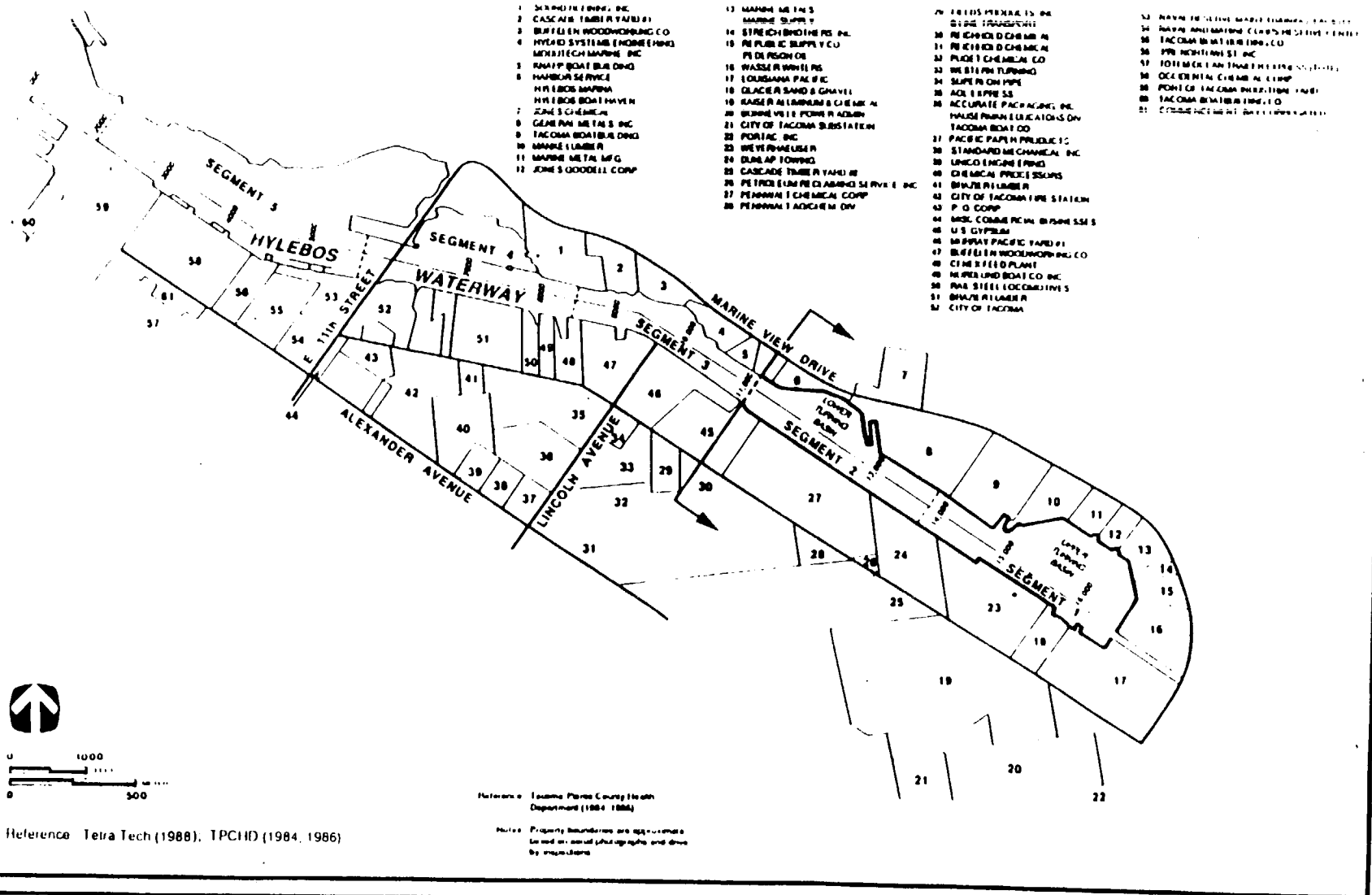


Figure C-2. Hylebos Waterway - Existing industries and businesses

Remedial activities at Pennwalt Chemical Corporation are regulated by both a consent decree signed in July 1987 and a stipulated agreement issued in March 1989. The decree requires the following:

- Characterization of the Pennite area (sludge, soil, and shallow groundwater)
- Characterization of the Wypenn area (soil and groundwater)
- Surface impoundment sampling and analysis
- Surface water quality sampling and analysis
- Following completion of characterization of the Pennite area, preparation of recommendations for mitigating arsenic contamination in the upper aquifer and implementation of the approved alternative.

Soil sampling and analysis plans for the Wypenn and Pennite areas were submitted in December 1987, and soil sampling at the Pennite area was completed in early 1988. The Wypenn soil sampling plan was approved in May 1989. The surface water quality and impoundment sampling plans were submitted to Ecology in August 1987. These plans were revised in May 1989 and will be completed by October 1989. A groundwater characterization report and an engineering evaluation work plan to mitigate arsenic contamination in the upper aquifer in the vicinity of the Pennite area were submitted in December 1987. The arsenic remediation feasibility study/remedial design work plan was approved in May 1989, and a completed feasibility study/remedial design for the Pennite area is expected in February 1990. Remedial action should begin in spring 1990 and require 1 year to complete. Construction on a new caustic tank farm facility began in January 1989 and will be finished in October 1989.

An administrative order issued in February 1988 addresses the extreme pH variations in the Pennwalt effluent. The order requires that Pennwalt either comply with dangerous waste permit-by-rule regulations or meet the exemption requirements. The administrative order has been superseded by a stipulated agreement signed in March 1989. Under the stipulated agreement, Pennwalt must meet the following requirements:

- Pay penalties for pH exceedance in the outfall
- Make interim and final upgrades to the pH neutralization system.

The interim neutralization system has been in place and operating effectively since June 1989. The final neutralization system must be operable prior to an NPDES permit renewal in August 1990.

No ongoing sources of polychlorinated biphenyls (PCBs) were identified in the CB/NT remedial investigation at General Metals, Inc. However, a subsequent PCB reconnaissance survey completed in July 1986 found elevated levels of PCBs (Stinson et al. 1987). Activities at the site are being conducted under an Ecology administrative order issued in August 1987 that requires General Metals to remove inactive PCB transformers and submit a work plan for complete site characterization. In February 1988, a work plan for site characterization and interim remedial action was submitted, and the order was amended to require that a conceptual site drainage plan be submitted and that source control remedial action be initiated. The preliminary remedial investigation was conducted between March and July 1988 and the continuing remedial investigation was submitted to Ecology in June 1989. A site stabilization plan was submitted to Ecology in September 1988, and Ecology amended the order to require implementation of the plan and preparation of a source control feasibility study. The source control feasibility study began in December 1988 and was completed in July 1989. Further source control activities after December 1989 will be enforced by an agreement or order which should be signed in October 1989. Various types of site stabilization activities began in March 1988 and continued until June 1989.

Remedial actions at the 3009 Taylor Way log sorting yard are regulated by a consent order signed in June 1987 between Ecology and the Pennwalt Chemical Corporation (the property owner). The order requires Pennwalt to prepare an engineering evaluation (surface water investigation) and conduct a remedial investigation/feasibility study at the site. Work plans for an engineering evaluation and a remedial investigation/feasibility study were submitted to Ecology in July and August 1987, respectively. Between July 1987 and January 1988 the surface water investigation was completed. A focused feasibility study submitted in March 1988 indicated that interim remedial action would not be required. Ecology has concurred with this conclusion and determined that remedial action will await the results of the remedial investigation/feasibility study. The remedial investigation work plan was approved in December 1987, and the remedial investigation began in February 1988. Between February and March 1988, the hazardous substances and hydrogeological investigations were completed. Wet weather sampling was completed in the spring of 1988. The submittal date of the final feasibility study is a negotiated item under the 1987 consent order. The remedial design/remedial action phase will be handled by either an amended or a new consent decree. The new consent decree will be consistent with the applicable or relevant and appropriate requirements (ARARs) of the Model Toxics Control Act and should be signed during the summer of 1990.

Activities at the Wasser Winters log sorting yard are regulated by a consent order, signed in March 1987, between Ecology and the Port of Tacoma (the property owner). A preliminary site characterization was completed in April 1987. In August 1987, a proposal by the Port of Tacoma to mitigate soils slag and wood waste onsite was submitted to Ecology and rejected. In January 1988, the Port of Tacoma agreed to prepare a proposal for an alternative remedial design incorporating mitigation of both surface water and groundwater contamination. This remedial design should be finished by February 1990. Remedial action should begin in March 1990 and be completed by December 1990.

Ecology issued an administrative order in June 1987 that requires Louisiana-Pacific log sorting yard to perform a site investigation and feasibility study. A surface water drainage study was completed in October 1987. A work plan for groundwater characterization was submitted by the PRP in November 1988. Groundwater characterization, which began in September 1988, includes installation of three monitoring wells, one round of sampling, and a tidal study. Groundwater sampling will be followed by groundwater monitoring. The feasibility study work plan was submitted to Ecology in January 1988, the draft feasibility study was submitted in September 1988, and the final feasibility study was submitted in February 1989. An addendum to the feasibility study was completed by Ecology in June 1989 to address several issues of concern not previously addressed. Remedial action should begin in June 1990 and be completed by October 1990.

Remedial action at Cascade Timber Yard #2 is regulated by the Puyallup Tribe settlement agreement. It is anticipated that this agreement will become effective in February 1990. Under the agreement, the Port of Tacoma must perform an environmental audit and prepare a cleanup plan. The environmental audit began in April 1989, and the sampling plan section of this audit will begin in October 1989. The Port of Tacoma has 3 years from the effective date of the agreement to complete the cleanup.

Remedial action at B&L Landfill is driven by a consent decree completed in February 1989. The consent decree requires a remedial investigation/feasibility study/remedial design by May 1990. The final remedial investigation should be completed in early 1990. Under an extension currently being negotiated, the final remedial action/remedial design will be completed in June 1990. The remedial action will require an amended or new consent decree. Of the nine PRP that have been identified, one PRP (Murray Pacific) has agreed to complete the remedial action if 30 percent matching public funds are provided.

Remedial activities at Tacoma Boatbuilding Company are driven by the Shipyard Education Program and the related NPDES permits being issued by Ecology and an administrative order effective July 1989. The Shipyard Education Program, currently underway, is designed to provide shipyard operators with information on appropriate best management practices. The NPDES permit

will be issued in December 1989. The NPDES permit and the administrative order will require that best management practices be implemented, monitored, and documented. Best management practices will include routine cleaning of the yard area; appropriate storage of paints, solvents, and other chemicals; the use of drip pans and containment structures to minimize dispersion of potentially hazardous solutions and dust; constraints on bilge and ballast water discharge; and explicit limitations on the discharge of all oil or hazardous material to the waterway.

USG Landfill has been associated with contamination in sediments at the Head of Hylebos Waterway but is not specifically included in the schedules because of a lack of recent activity. Remedial actions at USG Landfill are mainly historical and include excavation and removal of waste and capping of the site. Groundwater at the site is currently monitored, and no additional remedial activities are scheduled.

MOUTH OF HYLEBOS WATERWAY

The locations of existing industries, businesses, and discharges in Hylebos Waterway are shown in Figure C-2. Remedial activities at the Mouth of Hylebos Waterway are summarized in Figure C-3. Occidental Chemical is the major identified source of problem chemicals in this problem area. Several source control actions have been undertaken by Occidental Chemical in the past several years. In-plant modifications include the installation of taller chlorine stripping towers along with modifications in temperature regulation and modified waste handling practices. Effluent from the facility is monitored under an NPDES permit, which is due for renewal in March 1990. Most of the soil characterization was conducted in 1979. More than 10,000 cubic yards of soil contaminated with chlorinated organic compounds were removed from the site during 1981-1982, in accordance with a consent order.

Recent, ongoing, and planned activities at Occidental Chemical are driven by a Resource Conservation and Recovery Act (RCRA) Part B permit that specifies sediment sampling and sediment and groundwater remediation. The draft RCRA permit was completed in August 1988. The permit was completed in November 1988. Groundwater monitoring is ongoing, and the installation of six additional shallow wells was completed in September 1988. A sediment sampling plan approved by the U.S. Environmental Protection Agency (EPA) and Ecology in December 1987 is being implemented and a draft report will be completed by September 1989. Also expected in September 1989 is a draft groundwater corrective action plan for a groundwater extraction and treatment system. Construction on the extraction and treatment systems should begin early in 1991 and require a minimum of 8 months to complete.

SITCUM WATERWAY

The locations of existing industries, businesses, and discharges in Sitcum Waterway are shown in Figure C-4. Remedial activities in Sitcum Waterway are directed at Terminal 7 ore unloading facilities and Storm Drain SI-172, two primary sources of metals (Figure C-5). Remedial actions at Terminal 7 are limited to the implementation of best management practices. Spilled ore, which was formerly swept into the waterway, is now collected and sold to smelters. A closed conveyer belt is now used for transferring alumina ore from ships to storage areas. Best management practices are subject to routine monitoring to ensure that discharge of ore to the waterway is minimized. Routine monitoring (conducted as of July 1989) indicates that best management practices are being followed.

Storm Drain SI-172 is one of five storm drains in the CB/NT area included in the pollution control effort being implemented under the memorandum of agreement between Ecology, the city of Tacoma, and the Tacoma-Pierce County Health Department (TPCHD). The storm drain report required by the agreement was completed in July 1989. Between January 1987 and December 1988, chemical loading from the drain was monitored quarterly during high- and low-flow conditions. Also during this study period, business inspections were conducted to better characterize activities

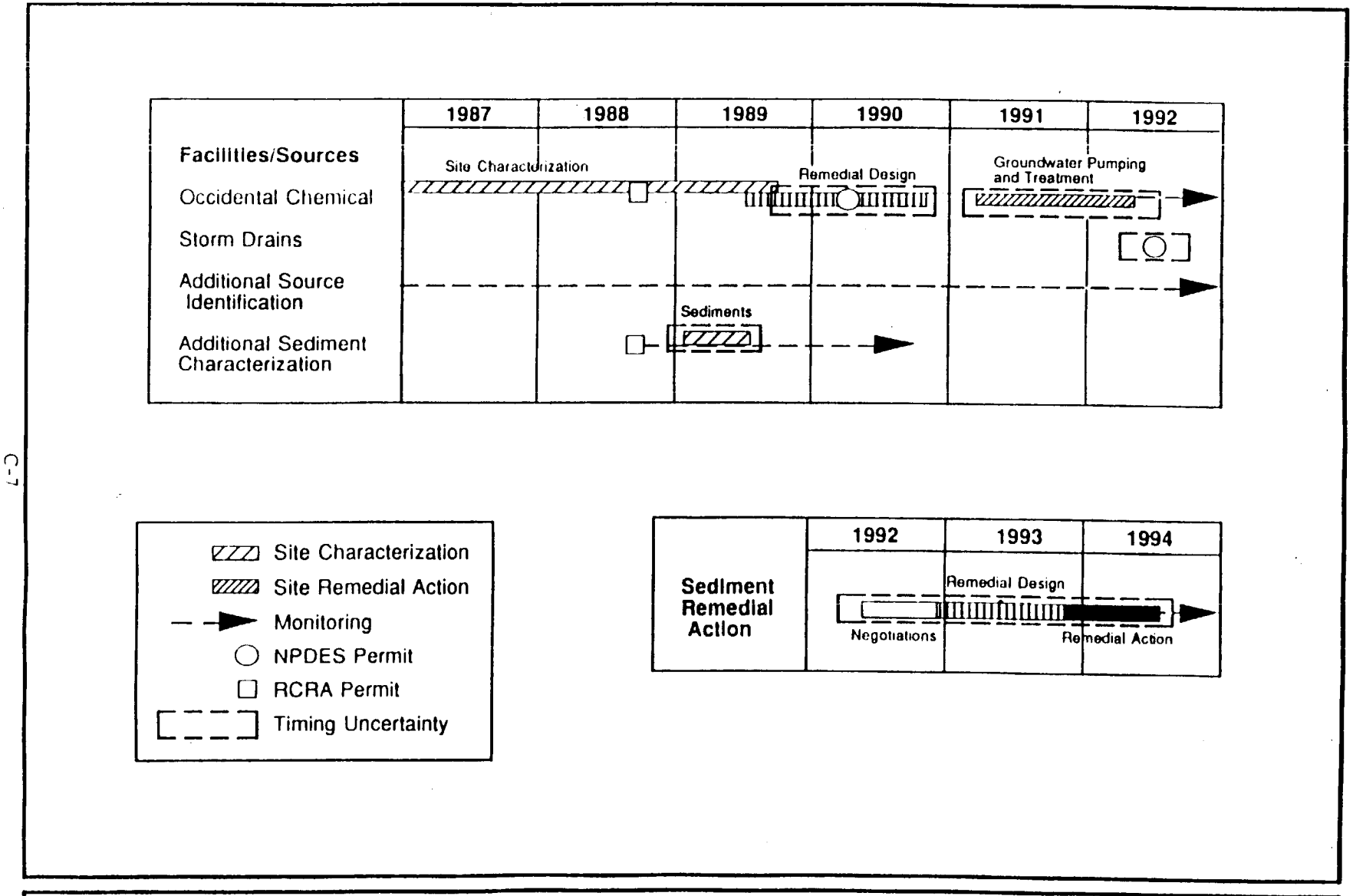


Figure C-3. Recent, ongoing, and planned activities at the Mouth of Hylebos Waterway

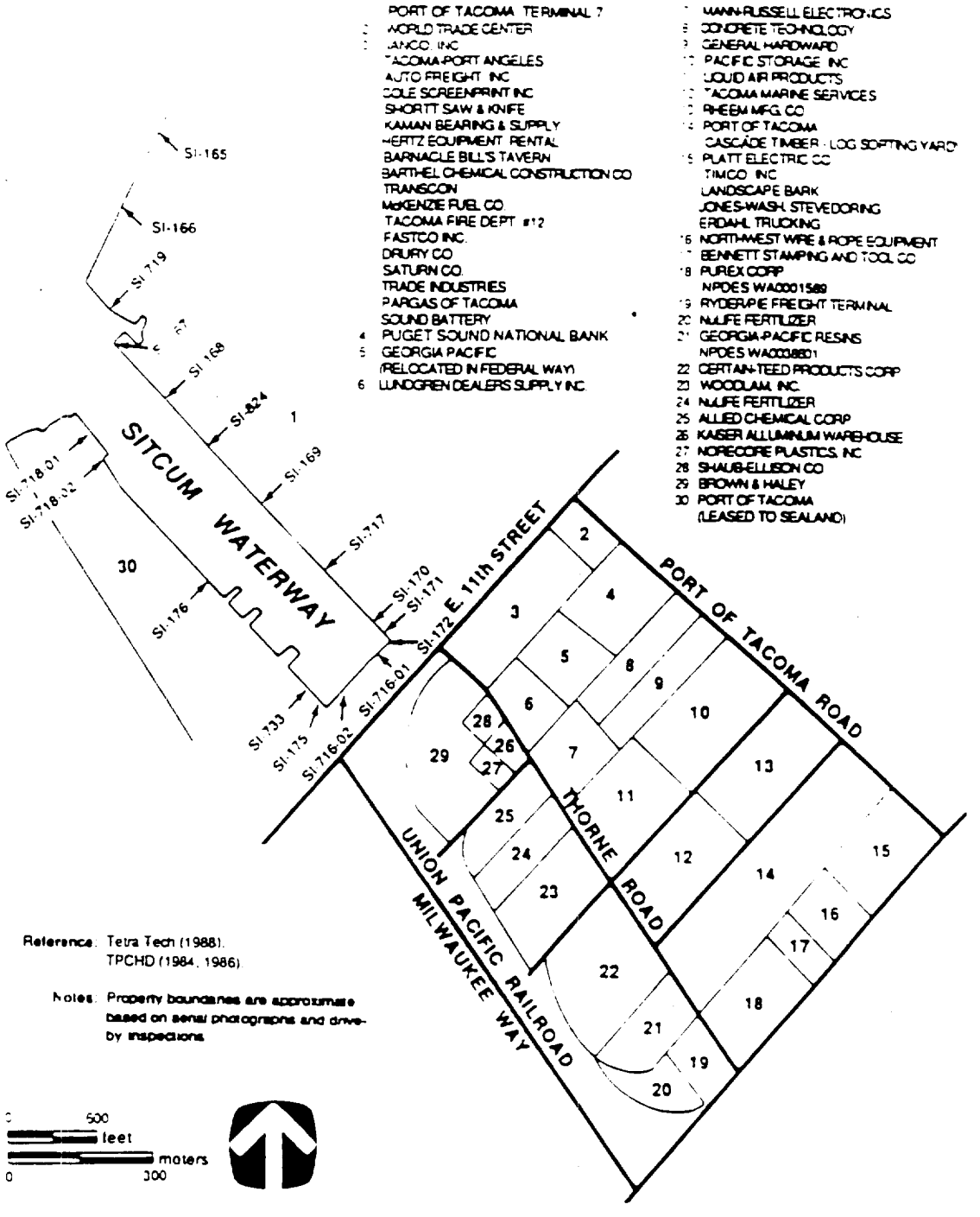


Figure C-4. Sitcum Waterway - Existing industries, businesses, and discharges

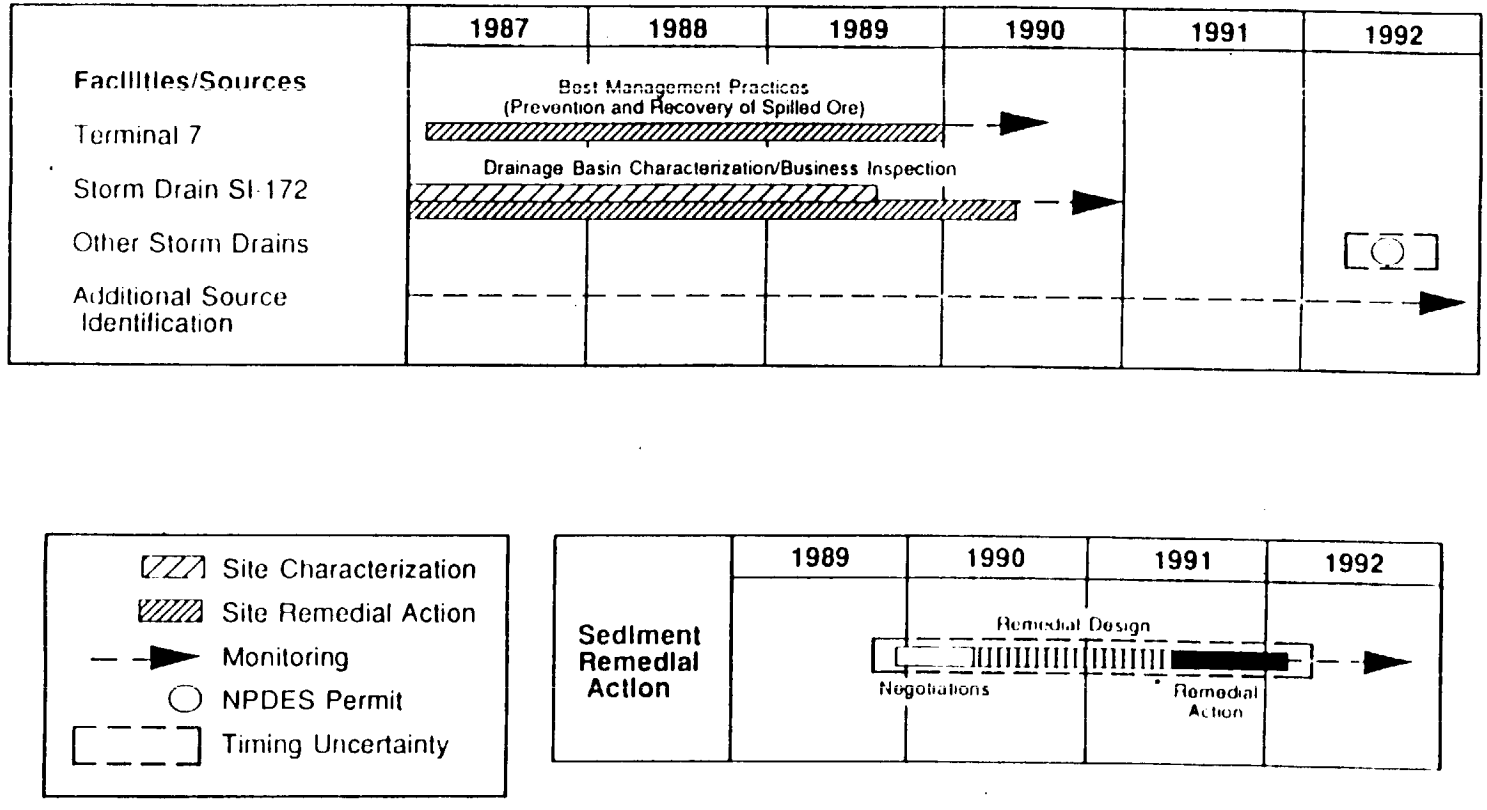


Figure C-5. Recent, ongoing, and planned activities in Sitcum Waterway

and implement appropriate corrective actions. Business inspections and storm drain monitoring have been extended until April 1990.

Significant source controls in Sitcum Waterway have been implemented, but their effectiveness has not yet verified.

At the time of this writing, the Port of Tacoma has plans to dredge over 40,000 cubic yards of material for maintenance and extension of Pier 1. Habitat replacement at the head of the waterway and a fish mitigation area are elements of the planned dredging. The navigational channel in Sitcum Waterway is also subject to routine dredging. Where possible, these dredging projects will be integrated into the implementation of the preferred sediment remedial alternative. Re-evaluation of the dredging schedule and resource availability may necessitate modification of the schedule for sediment remedial action.

ST. PAUL WATERWAY

The locations of existing industries, businesses, and discharges in St. Paul Waterway are shown in Figure C-6. Remedial activities are more advanced in St. Paul Waterway than in any other problem area. Simpson Tacoma Kraft pulp mill, the waterway's single major source of problem chemicals, has implemented numerous source control actions, including outfall relocation, process modifications, and best management practices. Recent, ongoing, and scheduled activities associated with the site are summarized in Figure C-7. Activities at the Simpson Tacoma Kraft pulp mill are driven by an order issued by Ecology in December 1985 and a consent decree signed in December 1987. The relocation of the treatment plant outfall required by the December 1985 order was completed in March 1988. Simpson also has initiated a remedial action and habitat restoration program in an effort to remediate sediments previously contaminated by waste discharged from the site. Under the December 1987 consent decree, Simpson has deposited sediments displaced during relocation activities in a shallow depression near the original outfall location. Capping of this and other sediments contaminated by historical discharge from the plant was conducted between July and September 1988. A habitat restoration program designed to mitigate adverse biological impacts was a key element of capping activities. The Simpson Tacoma Kraft Company is required under the December 1987 decree to monitor the long-term effectiveness of the capping and habitat restoration activities.

The effluent from the Simpson Tacoma Kraft pulp mill is monitored under an NPDES permit that is scheduled for renewal in December 1989. At that time, the permit may be modified to expand restrictions on toxic chemicals not previously covered in the permit and to incorporate additional monitoring requirements.

MIDDLE WATERWAY

The locations of existing industries, businesses, and discharges in Middle Waterway are shown in Figure C-8. Remedial activities in Middle Waterway have focused on two potential sources of metals, Marine Industries Northwest and Cooks Marine Specialties (Figure C-9). Remedial activities at these shipyards are driven by the Shipyard Education Program and related NPDES permits that are being implemented by Ecology. The Shipyard Education Program (currently underway) is designed to disseminate appropriate best management practices to shipyard operators. NPDES permits to be issued to these sites in December 1989 will require that best management practices be implemented and documented by monitoring. Best management practices covered in the permit will include routine cleaning of the yard area; appropriate storage of paints, solvents, and other chemicals; the use of drip pans and containment structures to minimize dispersion of potentially hazardous solutions and dust; and constraints on bilge and ballast water discharge. The permits will also include explicit limitations on the discharge of all oil and hazardous material to the waterway.

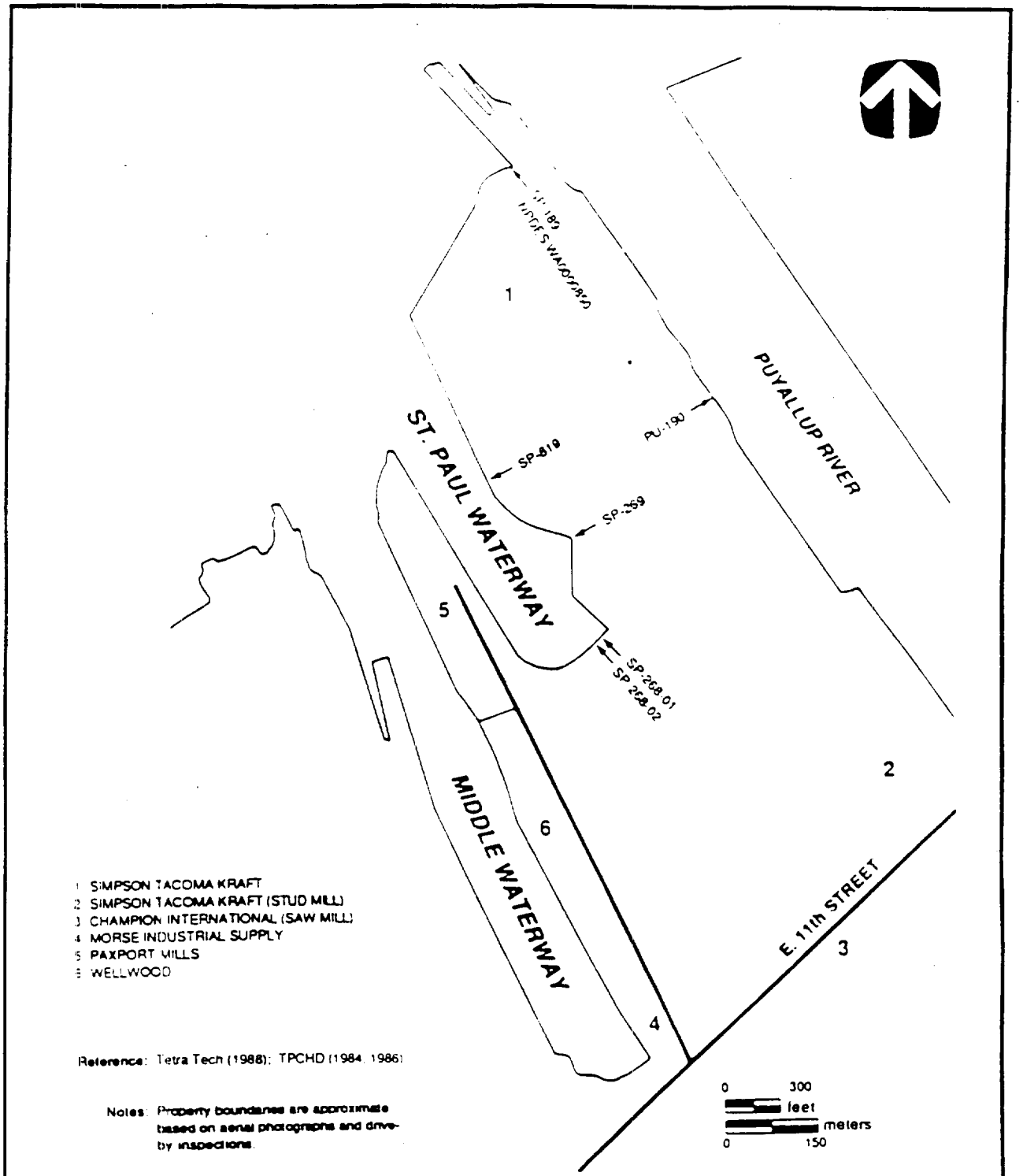


Figure C-6. St. Paul Waterway - Existing industries, businesses, and discharges

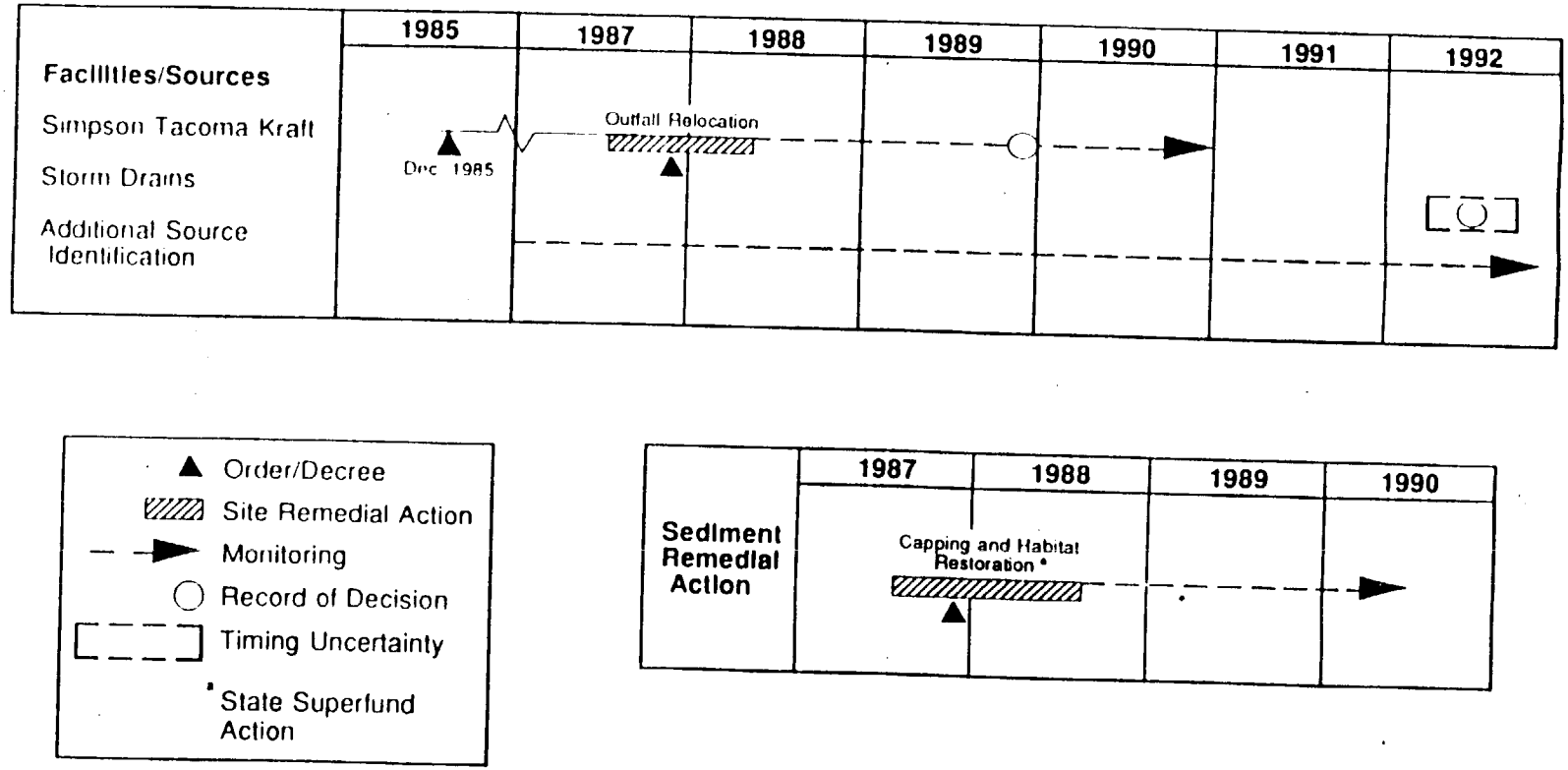


Figure C-7. Recent, ongoing, and planned activities in St. Paul Waterway

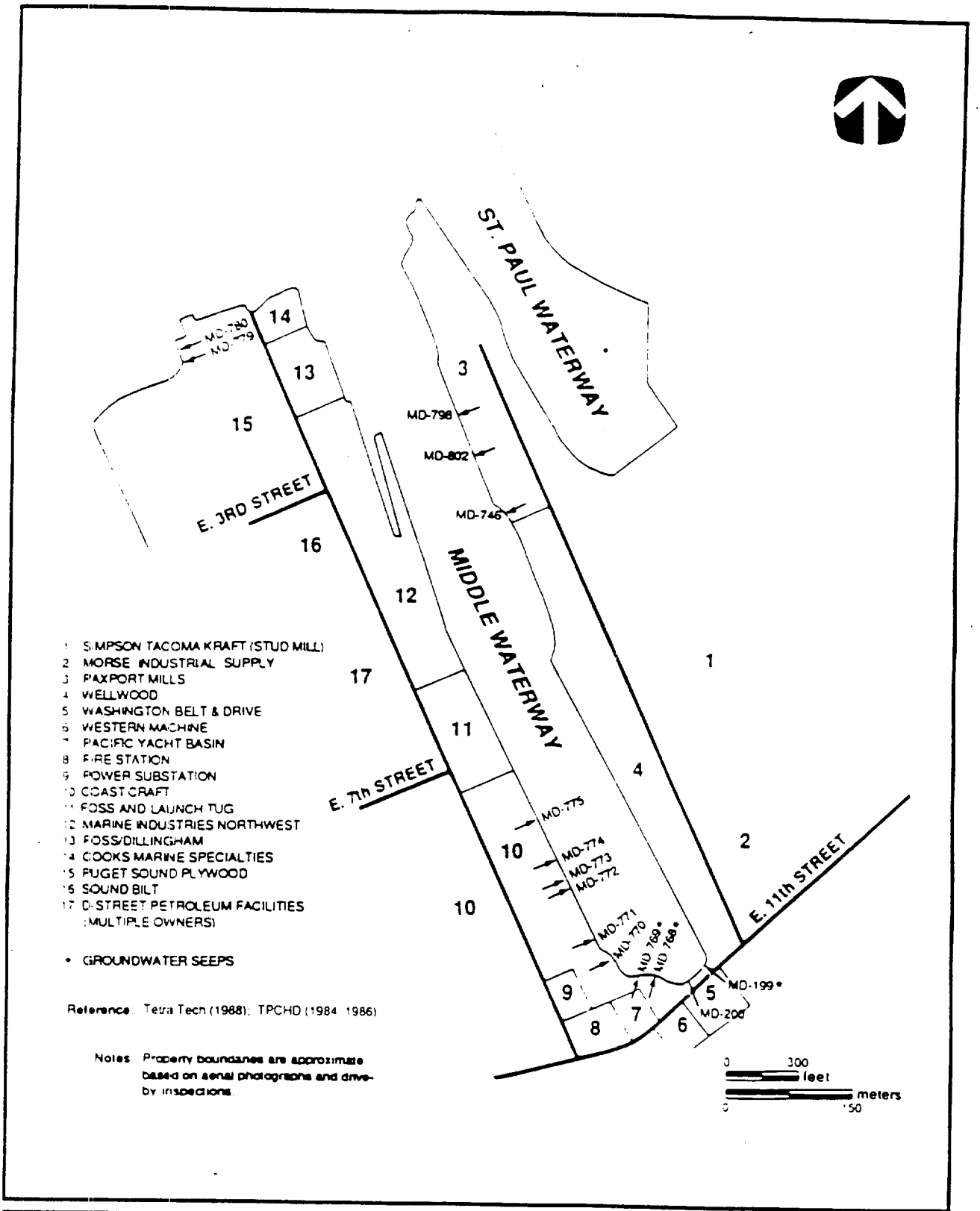


Figure C-8. Middle Waterway - Existing industries, businesses, and discharges

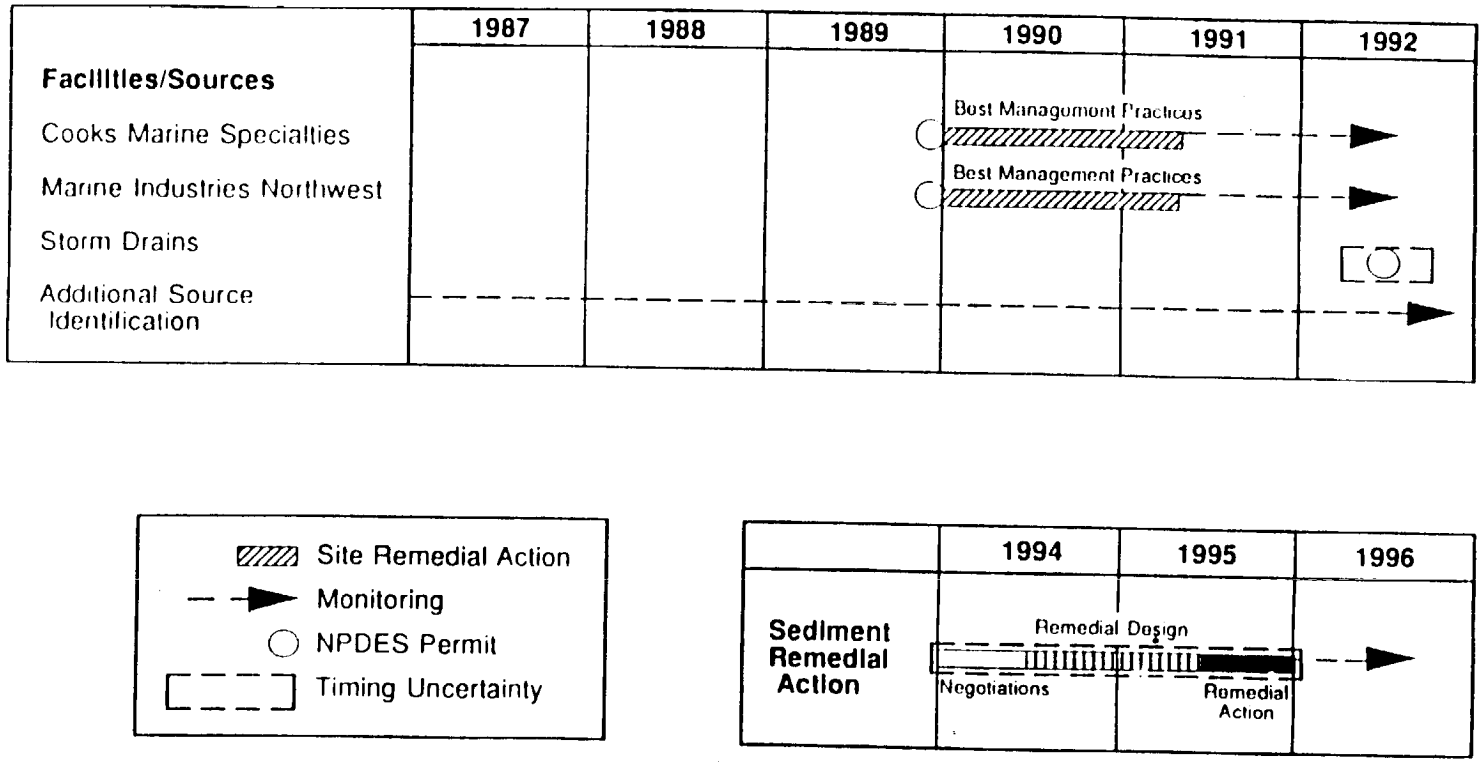


Figure C-9. Recent, ongoing, and planned activities in Middle Waterway

Storm Drain MD-200 was identified as a probable source of lower priority organic chemicals at the head of the waterway. Sediments in Storm Drain MD-200 were sampled in June 1987 and analyzed for problem chemicals. Remedial activities associated with Storm Drain MD-200 and other storm drains in Middle Waterway will be regulated by the new NPDES permit regulations that should be adopted in early 1990.

It is uncertain whether all major ongoing sources of contamination to Middle Waterway have been identified. The effectiveness of the best management practices implemented at the shipyards has not been verified. Between October 1989 and June 1990, inspections are schedule for Foss and Launch Tug Industries, Coast Craft, Paxport Mills, and Puget Sound Plywood. However, there is currently no indication that any of these businesses is a source of pollution to Middle Waterway.

HEAD OF CITY WATERWAY

The locations of existing industries and businesses in City Waterway are shown in Figure C-10. Remedial actions are underway for several of the sources that have been associated with problem chemicals in sediments at the Head of City Waterway (Figure C-11). City Waterway Marina, Inc. and Martinac Shipbuilding have plans to dredge in the near future. The navigational channel running the length of City Waterway is also subject to routine dredging. When possible, remedial action implementation will be coordinated with planned dredging within the waterway. Major sources of problem chemicals include: Storm Drains CS-237, CN-237, and CI-230 (e.g., metals and high molecular weight polycyclic aromatic hydrocarbons); Martinac Shipbuilding (metals only); and American Plating (primarily nickel).

American Plating is no longer an active facility. When active, the site was designated an RCRA dangerous waste generator. After the site became inactive, Ecology negotiated consent orders to mitigate contamination problems onsite. Emergency site stabilization at American Plating was performed by the site owner under a November 1986 consent order and was completed in June 1987. A second consent order signed in September 1987 stipulates additional site characterization, including 1) the chemical and spatial characterization of remaining waste onsite, 2) determination of the integrity of sumps, and 3) groundwater monitoring. In September 1987, EPA issued a RCRA enforcement order.

Ongoing remedial action at the site is driven by the RCRA closure process and the state Superfund law. A remedial investigation work plan was submitted to Ecology and EPA in February 1988 and was approved in April 1988. The draft remedial investigation report was submitted in July 1988. However, a preliminary review revealed several data gaps, particularly in the characterization of the vertical extent of soil contamination. An acceptable remedial investigation report was received in May 1989. The RCRA corrective action order is expected by October 1989. A corrective measures study will begin once the corrective action order is finalized in October 1989. The remedial action should begin during the summer of 1990 and require 6 months to complete.

Remedial activities at Martinac Shipbuilding are driven by the Shipyard Education Program and the related NPDES permits being implemented by Ecology. The Shipyard Education Program (currently underway) is designed to disseminate appropriate best management practices to shipyard operators. NPDES permit applications to be finalized in January 1990 will require that best management practices be implemented and documented by monitoring. Best management practices covered in the permit will include routine cleaning of the yard area; appropriate storage of paints, solvents, and other chemicals; the use of drip pans and containment structures to minimize dispersion of potentially hazardous solutions and dust; and constraints on bilge and ballast water discharge. The permit will also include explicit limitations on the discharge of all oil and hazardous material to the waterway.

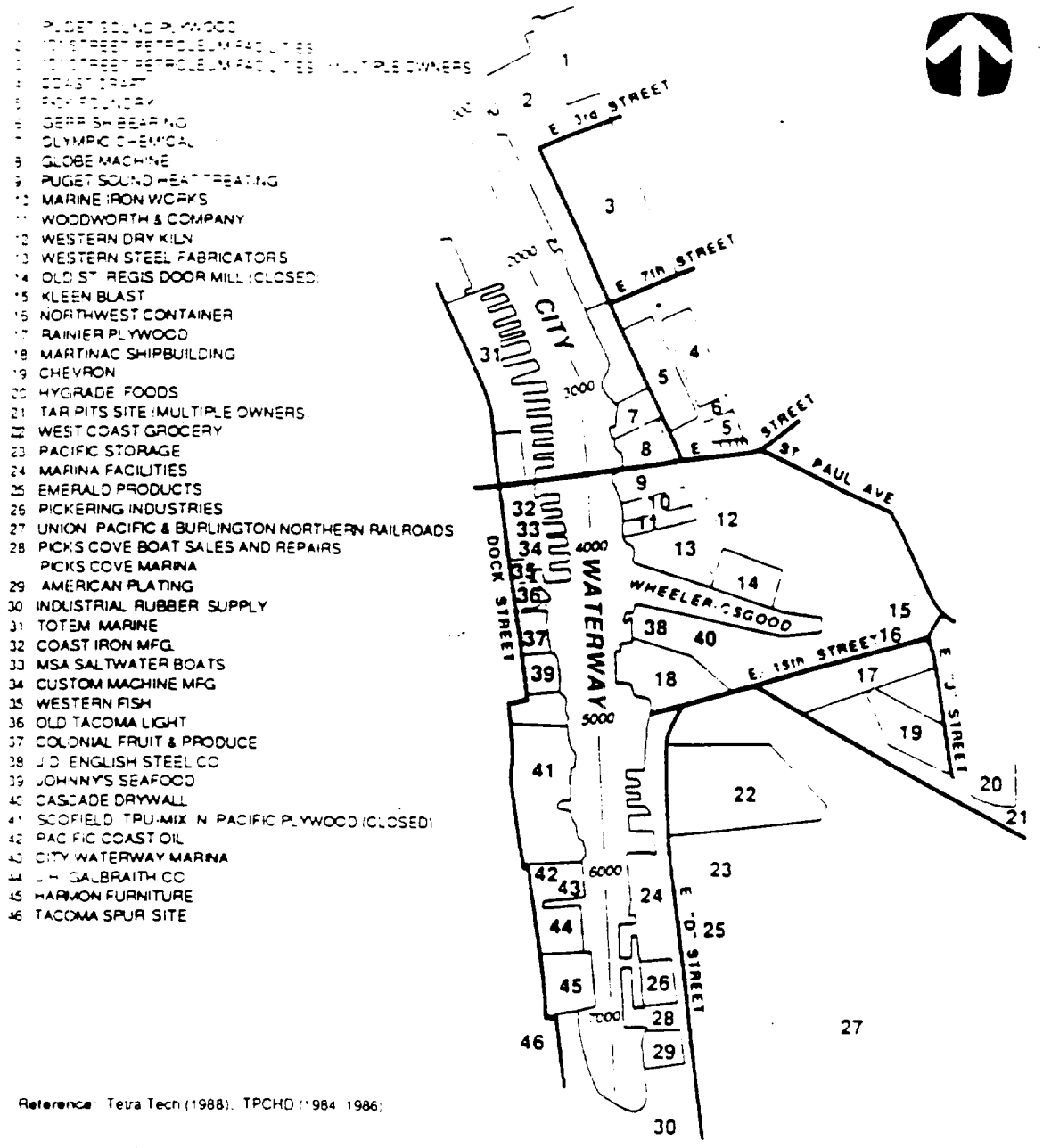


Figure C-10. City Waterway - Existing industries, businesses, and discharges

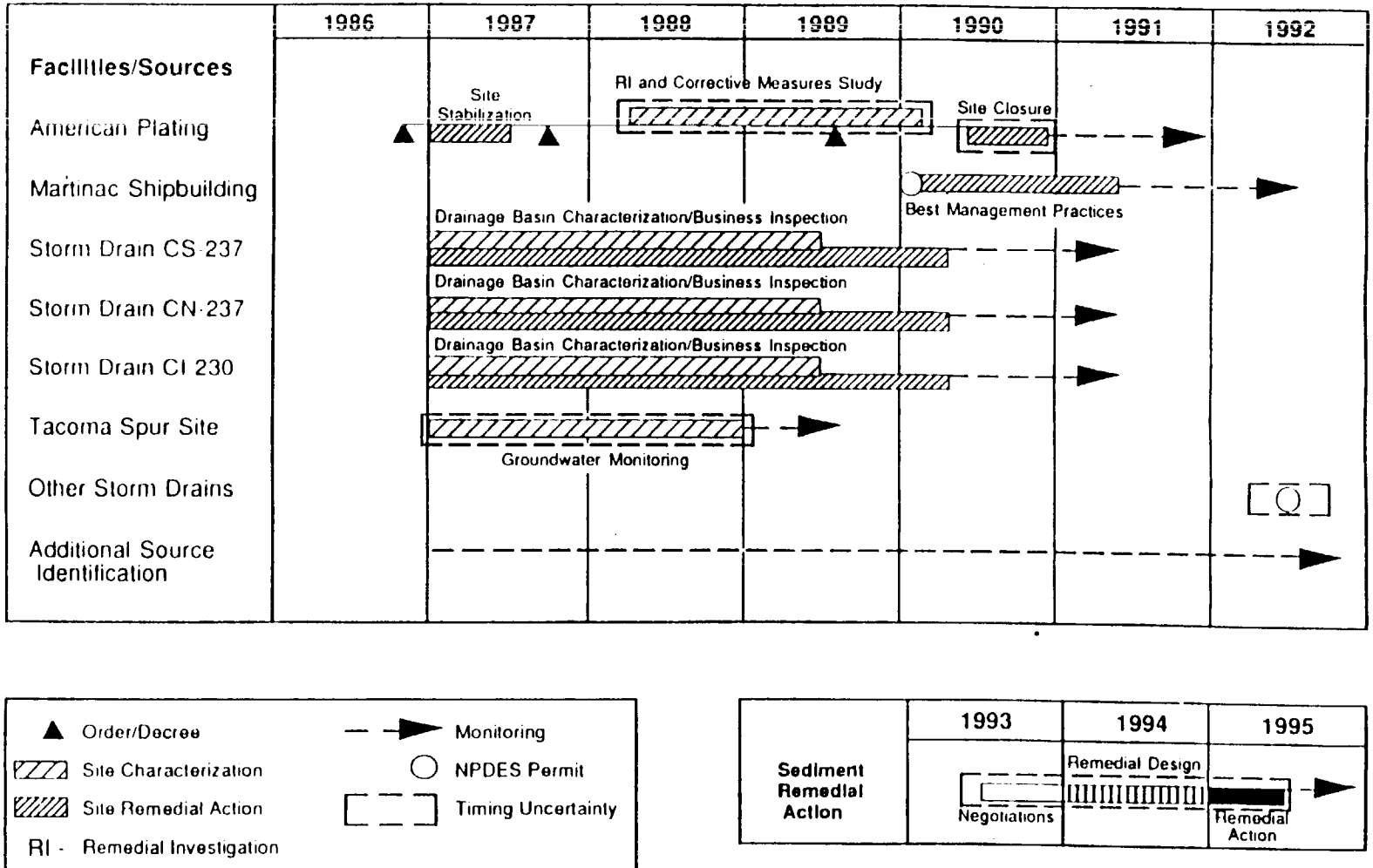


Figure C-11. Recent, ongoing, and planned activities at the Head of City Waterway

Groundwater monitoring is currently being conducted at the Tacoma Spur site. Approximately 17,500 tons of contaminated soils were removed from the site during highway construction. However, no additional remedial action is planned.

Storm Drains CS-237, CN-237, and CI-230 are three of the five CB/NT storm drains included in the pollution control effort being implemented under a memorandum of agreement between Ecology, the city of Tacoma, and the TPCHD. The storm drain report required by the agreement was completed in July 1989. Between January 1987 and December 1988, chemical loading from the drain was measured quarterly for high- and low-flow conditions. Business inspections have been conducted within the drainage basin during this study period to better characterize activities and implement appropriate corrective actions. Monitoring activities have been extended to April 1990. The Tacoma sewer utility is evaluating the feasibility of sediment detection basins to control contaminant discharge into the waterway from Storm Drains CN-237 and CS-237. A report on the sediment detention evaluation will be completed in October 1989.

WHEELER-OSGOOD WATERWAY

The locations of existing industries and businesses in Wheeler-Osgood Waterway are shown in Figure C-10. Remedial activities in Wheeler-Osgood Waterway are summarized in Figure C-12. Storm Drain CW-254 has been identified as the waterway's major ongoing source of problem chemicals. Storm Drain CW-254 is one of five storm drains included in the pollution control effort being implemented under a memorandum of agreement between Ecology, the city of Tacoma, and the TPCHD. The storm drain report required by the agreement was completed in July 1989. Between January 1987 and December 1988, chemical loading from the drain was monitored quarterly for high-and low-flow conditions. Also during this study period, business inspections are conducted within the drainage basin to better characterize activities and implement appropriate corrective actions. Quarterly sampling of the drain has been extended to April 1990.

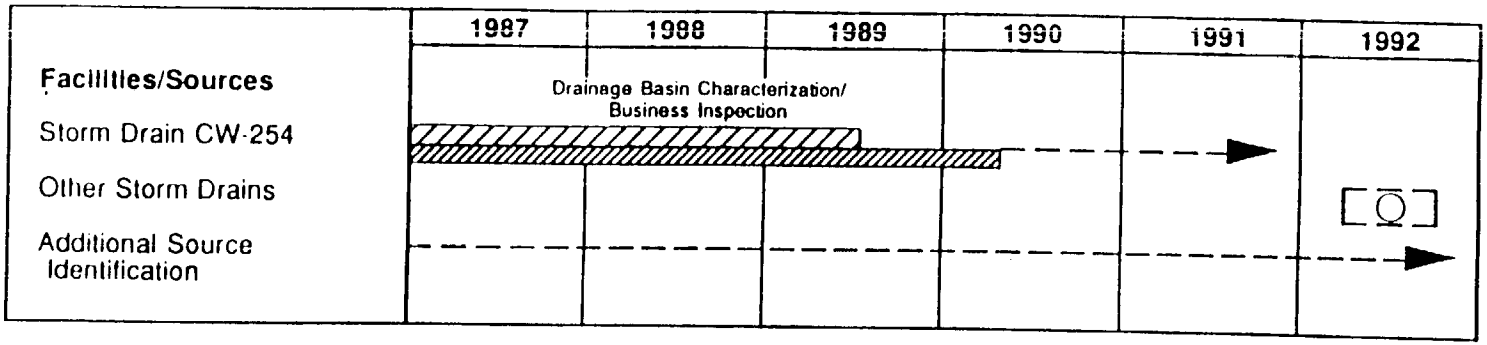
A separate environmental audit was voluntarily undertaken by Chevron at its bulk plant facility between January and March 1989. The audit indicates that drill cuttings at the site are a source of total petroleum hydrocarbons. A voluntary full-scale investigation and cleanup by Chevron is anticipated.

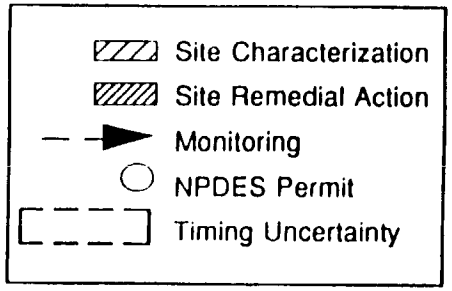
MOUTH OF CITY WATERWAY

The locations of existing industries and businesses in City Waterway are shown in Figure C-10. Remedial activities at the Mouth of City Waterway are summarized in Figure C-13. The D Street petroleum facilities are an identified source of LPAH in the sediments in this problem area. A trench recovery system was installed as an interim remedial measure between September 1987 and January 1988. This system is expected to affect mainly the surface aquifer near Globe Machine; its effect on property farther north is unknown. Discharged product is also being recovered from wells on Globe Machine and Mobil properties. A consent order issued in November 1988 requires 1) interim remedial action at the site including floating product recovery (already underway) and leak detection/prevention, 2) a remedial investigation of soil, groundwater, surface water, and possibly sediment contamination, and 3) additional remedial action as appropriate.

The remedial investigation report submitted in June 1989 included recommendations that the following tasks be undertaken:

- Floating product plume mapping
- Dissolved contaminant sampling, analysis, and mapping
- Design of an upgraded effluent treatment system.





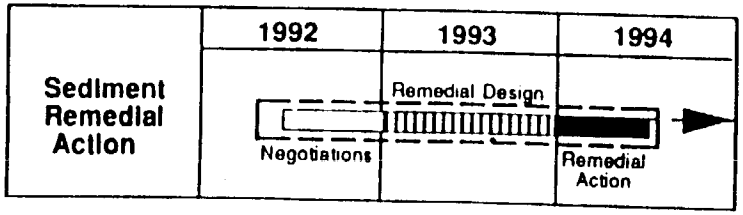
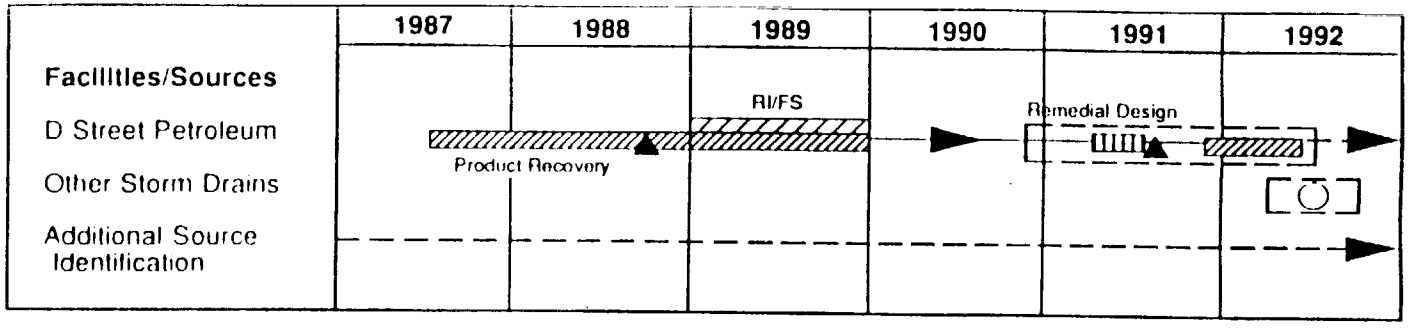
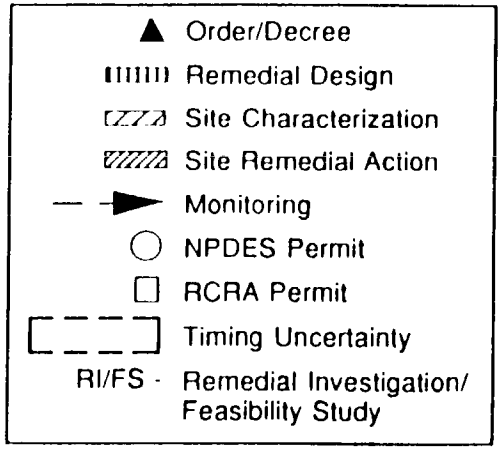


Figure C-12. Recent, ongoing, and planned activities in Wheeler-Osgood Waterway





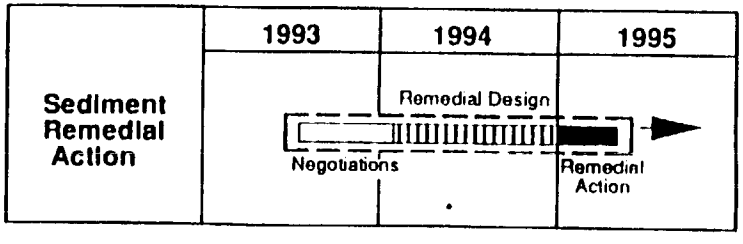


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Figure C-13. Recent, ongoing, and planned activities at the Mouth of City Waterway

Under the consent order the feasibility study will be completed by December 1989, and the remedial design will be completed in November 1991 or 4 months after levels of free product removal drop below 20 gallons per day for 1 complete month. The remedial action will be conducted under an amended or a new consent order in compliance with the Model Toxics Control Act.

APPENDIX D

Revised Cost Estimate for Confinement Option

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Table D-1. Cost categories applicable to each type of remedial action D-2

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REVISED COST ESTIMATE FOR CONFINEMENT OPTIONS

Revised cost estimates for the Commencement Bay/Nearshore Tideflats problem areas were prepared using principally the feasibility study (Tetra Tech 1988) as a source for unit costs and other factors (e.g., dredged deployment costs, production rates, sample analysis costs). Information presented by reviewers of the feasibility study suggested that some unit costs or other factors were questionable or erroneous. In these cases, these estimates were examined and revised in accordance with information presented by the reviewers or available from other sources. Each of the cost categories shown in Table D-1 is discussed below, including the value used, the rationale for its selection, and any special features of its application.

CORE SAMPLING FOR REMEDIAL DESIGN

A collection cost of $1,500 per core is used; this is the figure cited in the feasibility study (Tetra Tech 1988). The number of cores is presumed to be one per 4,000 cubic yards of sediment; this rate corresponds to the value used in the feasibility study and to PSDDA guidance for areas with the highest contamination ranking (PSDDA 1988).

CHEMICAL ANALYSIS FOR REMEDIAL DESIGN

Sample analysis costs differ with the problem area, according to the costs estimated in the feasibility study. These costs ranged from $800 to $1,500 per sample. Analysis of three samples from each core is presumed, in accordance with the feasibility study.

DESIGN/PERMITTING

The cost assigned to this category is $325,000 (Gershman, Brickner & Bratton 1989). The feasibility study does not include this cost category. *Confined Disposal of Contaminated Sediments, Documentation of Standards Development* (Parametrix 1989) recommends costs from $810,000 (for confined aquatic disposal) to $1,860,000 (for an upland mixed disposal site).

EQUIPMENT MODIFICATIONS

Equipment modifications for Commencement Bay sites consist of alterations to the clamshell bucket to make it watertight. The cost of $20,000 per clamshell, cited in the feasibility study, is used. Only one dredge at each problem area is presumed to be practical, hence the cost of one such modification is included for each problem area.

SITE ACQUISITION

Upland disposal is presumed to take place at one of the sites identified in U.S. Army COE (1985). Land costs in a commercial location are estimated to be $25,000 per acre. The total acreage required is computed as a function of the fill depth at the disposal site and the volume of material to be disposed of (after swelling and compaction).

TABLE D-1. COST CATEGORIES APPLICABLE TO EACH TYPE OF REMEDIAL ACTION

Cost Category	Nearshore	Upland	Capping	Overdredging Confined Aquatic Disposal
Siting and Construction				
Core sampling for remedial design	x	x	x	x
Chemical analysis for remedial design	x	x	x	x
Design/permitting	x	x	x	x
Equipment modifications	x	x		x
Site acquisition	x	x		
Site preparation (dikes, weirs)	x	x		
Site liner	x	x		
Operation				
Equipment mobilization	x	x	x	x
Contaminated sediment dredging	x	x		x
Marine transportation of contaminated sediment	x	x		
Overland transportation of contaminated sediment		x		
Barge unloading to disposal site	x			x
Barge unloading to trucks		x		
Confined aquatic disposal site dredging				x
Disposal costs and fees	x	x		x
Capping of upland/disposal site	x	x		
Clean sediment dredging for contaminated site cap	x	x	x	
Clean sediment transportation for contaminated site cap	x	x	x	
Post Closure				
Confirmation sampling	x	x		
Confirmation analysis	x	x		
Well construction	x	x		
Monitoring sampling of disposal site	x	x	x	x
Monitoring sample analysis	x	x	x	x
Administration	x	x	x	x
Contingency	x	x	x	x

SITE PREPARATION

Site preparation costs were assessed only for the upland disposal alternative. These were estimated by using values from Table 5-4 of U.S. Army COE (1985), and applying an annual inflation rate of 5 percent to adjust the 1984 costs to 1989 dollars. The resulting value is $1.30/ cubic yard of site capacity. Cost estimates were based on the assumption that all material from the problem area could be disposed of in the upland site, thus this cost is computed as $1.30/cubic yard of contaminated sediment after swelling and compaction.

SITE LINER

Liner costs also were assessed only for the upland disposal option. The liner is presumed to be 3 feet of clay over the entire area of the disposal site. The unit cost is based on Table 5-6 of U.S. Army COE (1985), and inflated from 1982 to 1989 dollars at a rate of 5 percent per year, yielding a value of $22.92/cubic yard of liner. Total cost is computed as the product of site area, liner depth, and the unit cost.

Use of other liner material, inclusion of a membrane, construction of a drainage system, and other modifications of this simple scenario may substantially affect the costs.

EQUIPMENT MOBILIZATION

The feasibility study lumps equipment mobilization with bonding and insurance, and calculates this as a fixed percentage of other costs. The approach used here is to assign a fixed cost to mobilization. The generic unit cost for a clamshell dredge used here is $150,000 per dredge (Parametrix 1989).

For remedial alternatives that include capping of the dredging site, total mobilization costs were based on the assumption that one dredge would be operating in the problem area and another at the source of clean sediment (e.g., the Puyallup River). The mobilization cost of the Puyallup River dredge was apportioned among the problem areas according to the fraction of total area to be capped in each.

CONTAMINATED SEDIMENT DREDGING

The unit cost of dredging may vary considerably, as described above, and as shown in the references. For this cost analysis a value of $3.00/cubic yard is used. This is based on a brief review of recent bids for dredging in Puget Sound (Sumeri, A., 1989, personal communication), which averaged approximately $2.50/cubic yard; and the costs estimated by Corlett and Kassebaum (1989), which ranged from $2.50/cubic yard to $12.00/cubic yard.

MARINE TRANSPORTATION OF CONTAMINATED SEDIMENT

Transportation of sediment by barge is estimated to cost about $0.30/cubic yard-mile, based on the figure of $0.25/cubic yard-mile cited in U.S. Army COE (1985), and adjusted for inflation. This is comparable to the cost of $0.25/cubic yard-mile cited in PSDDA (1988). Transportation costs were based on the volume of sediment after swelling.

OVERLAND TRANSPORTATION OF CONTAMINATED SEDIMENT

Overland transportation of contaminated sediment is estimated to cost $0.50/cubic yard-mile, based on the marine transportation cost and the suggestion that trucking costs will exceed barging costs by about $0.20/cubic yard-mile (U.S. Army COE 1985). Transportation costs were based on the volume of sediment after swelling.

BARGE UNLOADING TO DISPOSAL SITE

A unit cost of $1.25/cubic yard that was used in the feasibility study is used for this cost analysis. Unloading costs were based on the volume of the sediment after swelling.

BARGE UNLOADING TO TRUCKS

A unit cost of $2.50/cubic yard is used, based on an estimated cost of $500,000 for 200,000 cubic yards of sediment (Parametrix 1989). Note that PSDDA (1988) has used a cost of $1.50/cubic yard.

CONFINED AQUATIC DISPOSAL SITE DREDGING

The cost of confined aquatic disposal site dredging is presumed to be equivalent to that for dredging of contaminated sediment (i.e., $3.00/cubic yard). Because of the overdredging approach, however, the sediment removed to create the confined aquatic disposal site will be deeper than the contaminated material. This additional depth may increase the unit cost. For example, Corlett and Kassebaum (1989) estimate that at the head of City Waterway problem area, removal of the first five feet of sediment will cost $2.50/cubic yard, but removal of the underlying three feet will cost $8.00/cubic yard.

The volume of material to be dredged for the confined aquatic disposal site is computed as the swollen and compacted contaminated volume plus the capping depth times the contaminated area. No estimation was attempted of the excess volume that would have to be dredged due to slumping of the excavation.

DISPOSAL COSTS AND FEES

The fee of $0.40/cubic yard proposed by the Washington Department of Natural Resources (Corlett and Kassebaum 1989) for disposal at PSDDA Phase I disposal sites is used here. It is applied only to the excess volume of clean sediment removed from the confined aquatic disposal site. This sediment is presumed to meet PSDDA guidelines for open-water disposal.

CAPPING OF UPLAND/NEARSHORE DISPOSAL SITE

The unit cost used is based on a cap of 3 feet of sand and 3 feet of topsoil. In-place costs for these materials are taken from Table 5-6 of U.S. Army COE (1985), and inflated from 1982 to 1989 costs at a rate of 5 percent per year. The resulting average unit cost is $23.84/cubic yard of capping material. The total volume of capping material is computed by multiplying the upland site area times the depth of cap (2 yards). A similar approach could be taken to estimating capping costs for a nearshore disposal site.

This generic cap may not be suitable for all sites; some may require a greater depth of material, different material (synthetic fabric, asphalt, concrete, or clay), revegetation, or other special measures taken for drainage or erosion control.

CLEAN SEDIMENT DREDGING FOR CONTAMINATED SITE CAP

Dredging of clean sediment is presumed to have a cost equivalent to that of contaminated sediment dredging ($3.00/cubic yard).

CLEAN SEDIMENT TRANSPORTATION FOR CONTAMINATED SITE CAP

Transportation of clean sediment is presumed to have a cost equivalent to that of marine transportation of contaminated sediment ($0.30/cubic yard-mile.).

CONFIRMATION SAMPLING

Confirmation sampling following removal of dredged material is presumed to be carried out by the collection of a grab sample of the sediment surface rather than a core, following the suggestion of the Commencement Bay Group (ENSR 1989). The cost of sample collection is estimated to be $500 per grab, producing one sample per grab. The number of samples is estimated as in the feasibility study: two samples per acre, with a maximum of 20 samples at a site.

CONFIRMATION ANALYSIS

Samples taken to confirm the success of remedial dredging are presumed to be analyzed for the same contaminants as the samples used to characterize the problem areas. Thus, the analysis cost varies with the problem area as specified in the feasibility study.

WELL CONSTRUCTION

The costs of establishing groundwater monitoring wells at upland and nearshore sites are based on drilling costs of $22.00 per foot, $600 for a screen (Deremer, R., 1989, personal communication), and an estimated $800 for a pump and equipment deployment. These unit costs were applied to an estimated 20 wells (the maximum number of sediment monitoring stations suggested by the feasibility study) of an average depth of 35 feet (the depth of fill possible at Blair Waterway Slip 1).

MONITORING SAMPLING OF DISPOSAL SITE

Sampling of confined aquatic disposal and capping sites is presumed to take place by coring, as specified in the feasibility study, with a cost of $1,500 per core. Frequency of sampling is two cores per acre, with a maximum of 20 cores. Sampling is presumed to be conducted yearly, and three samples analyzed from each core.

Sampling of groundwater monitoring wells is estimated to cost $120 per well, based on two hours of labor at $30 per hour (including sampling by a safety-certified specialist, document control, quality assurance, data management, and reporting), $30 of other direct costs per well, and a multiplier of 1.5. Frequency of sampling is presumed to be equivalent to that for coring at confined aquatic disposal and capping sites.

MONITORING SAMPLE ANALYSIS

Analysis costs for monitoring samples are presumed to be site-specific, as was assumed for the analysis costs for remedial design sampling and confirmation sampling. The site-specific costs used are those listed in the feasibility study.

ADMINISTRATION

Administration costs calculated in the feasibility study were as a percentage of all other costs. A similar approach was taken for the spreadsheet cost analysis. The feasibility study estimate included engineering costs, however, which were included in the design and permitting classification in the revised cost analysis. The factor for administration cost was therefore revised downward from the feasibility study value of 15 percent to 8 percent. The *EPA Remedial Action Costing Procedures Manual* (U.S. EPA 1985) suggests a range of 7-15 percent of capital costs for administration, including design and monitoring. The typical cost suggested by the *Multiuser Confined Disposal Sites Program Study* (Gershman, Brickner, and Bratton 1989) is 6 percent.

CONTINGENCY

A contingency cost of 20 percent of all other costs was applied. This is the same proportion used for the feasibility study.

OTHER FACTORS

Two factors were used to estimate the effect of sediment swelling and compaction. The swelling factor determines the increase in sediment volume after dredging and deposition in a barge; and the compaction factor determines the decrease in volume after confinement and compaction of the sediment. The swelling factor used for the revised cost estimate is 0.75, meaning that sediment would increase in volume by 75 percent upon dredging (Church 1981). As noted previously, this factor may be highly variable, so a value at the upper range of reported swelling factors was chosen. The compaction factor was chosen so that the net volume change from the original sediment in place would be an increase of 20 percent; the value of this factor is therefore selected to be 0.69 (i.e., 1.20/1.75).

The discount rate used for this revised cost calculation is 7 percent, which is a slightly lower estimated rate than the current rate of return on 2-year Certificates of Deposit.

The production rate for dredging was presumed to be 200 cubic yards/hour, as shown in Table 5-2 of U.S. Army COE (1985) for a 5-cubic yard clamshell dredge.

A dredging lift depth of four feet, typical of clamshell dredges (PSDDA 1988) is used for this calculation. The actual volume dredged is calculated based on the number of dredging lifts that would completely remove the contaminated sediment. Thus, contamination to a depth of 2 feet would require one dredging lift (with overdredging of 100 percent), whereas contamination to a depth of 5 feet would require two dredging lifts (with overdredging of 60 percent).

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EXPLANATION OF SIGNIFICANT DIFFERENCES
COMMENCEMENT BAY NEARSHORE/TIDEFLATS SUPERFUND SITE

August 2000

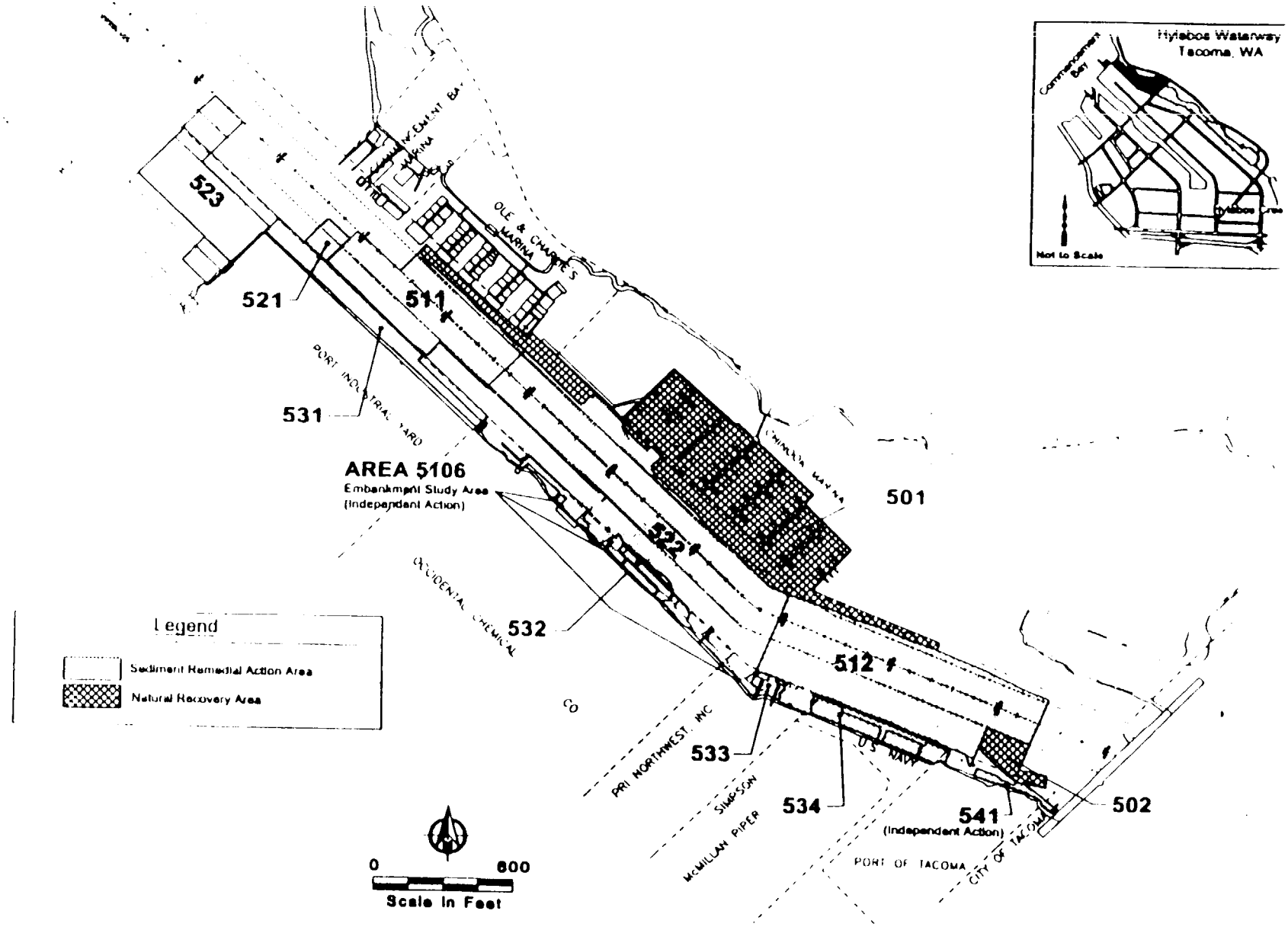

Figure 3A

Hylebos Waterway Cleanup Areas

EXPLANATION OF SIGNIFICANT DIFFERENCES
COMMENCEMENT BAY NEARSHORE/TIDEFLATS SUPERFUND SITE

August 2000

I. INTRODUCTION

A. Site Name and Location

The Commencement Bay Nearshore /Tideflats (CB/NT) Superfund site is located in Tacoma, Washington, at the southern end of the main basin of Puget Sound (Fig. 1). This Explanation of Significant Differences (ESD) describes the cleanup plans for the Thea Foss, Wheeler-Osgood and Hylebos waterways and identifies the disposal sites being selected to contain dredged contaminated sediments from Thea Foss (formerly City) and Wheeler-Osgood, Hylebos, and Middle waterways. The cleanup plan for Middle Waterway will be outlined in a separate ESD in the fall of 2000.

B. Lead and Support Agencies

U.S. Environmental Protection Agency (EPA) – Lead Agency for Sediment Remediation

Washington State Department of Ecology (Ecology) - Lead Agency for Source Control; Support Agency for Sediment Remediation

Puyallup Tribe of Indians - Support Agency for Sediment Remediation

C. Statutory Authority

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 117(c) and National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Section 300.435(c)(2)(i).

D. Purpose

EPA's September 30, 1989 Record of Decision (ROD) for the CB/NT Superfund site selected a remedy involving a combination of five key elements: site use restrictions (now commonly referred to as institutional controls), source control, natural recovery, sediment remedial action (i.e., confinement and habitat restoration), and monitoring, to address contaminated sediments in the waterways of the CB/NT site. This ESD describes the specific manner in which the ROD is being implemented at these individual waterways and points out the significant differences between the ROD and the cleanup plans described in this ESD. The ESD will: (1) describe the

remedial actions consistent with the ROD to clean up contaminated sediments in the Thea Foss, Wheeler-Osgood, and Hylebos waterways of the CB/NT Superfund site; and (2) identify disposal sites that will be used to contain the contaminated sediments to be dredged from Thea Foss, Wheeler-Osgood, Hylebos, and Middle waterways.

II. BACKGROUND

A. Site History

The CB/NT Superfund site is located in Tacoma, Washington at the southern end of the main basin of Puget Sound (Fig. 1). The site includes 10-12 square miles of shallow water, shoreline, and adjacent land, most of which is highly developed and industrialized. The upland boundaries of the site are defined according to the contours of localized drainage basins that flow into the marine waters. The marine boundary of the site is limited to the shoreline, intertidal areas, bottom sediments, and water of depths less than 60 feet below mean lower low water level (MLLW). The nearshore portion of the site is defined as the area along the Ruston shoreline from the Mouth of Thea Foss Waterway to Pt. Defiance. The tideflats portion of the site includes the Hylebos, Blair, Sitcum, Milwaukee, St. Paul, Middle, Wheeler-Osgood, and Thea Foss waterways; the Puyallup River upstream to the Interstate-5 bridge; and the adjacent land areas.

In 1996, EPA deleted the St. Paul Waterway, the Blair Waterway, and all or part of four properties transferred to the Puyallup Tribe in the Puyallup Land Settlement Agreement from the National Priorities List (NPL) because cleanups had been completed in these areas, or studies had been completed showing that they did not require cleanup.

EPA placed the CB/NT site on the NPL of sites requiring investigation and cleanup under EPA's Superfund Program on September 8, 1983. A remedial investigation/feasibility study (RI/FS) was completed by Ecology in 1988. EPA made the final RI/FS available for public comment in February 1989. The RI/FS evaluated contaminants detected in sediments at the CB/NT Superfund site to identify problem chemicals that pose a risk to human health and the environment. The RI/FS concluded that sediments in the nearshore/tideflats area were contaminated with a large number of hazardous substances at concentrations greatly exceeding those found in Puget Sound reference areas. In the RI, a multi-step decision-making process was used to identify problem chemicals, and to identify and prioritize problem areas where these chemicals were present at concentrations that are harmful to humans and wildlife.

Contaminants found at elevated levels in the Thea Foss and Wheeler-Osgood waterways included zinc, lead, mercury, high molecular weight polycyclic aromatic hydrocarbons (HPAHs), low molecular weight polycyclic aromatic hydrocarbons (LPAHs), cadmium, copper, nickel, 2-methylphenol, 4-methylphenol, bis[2-ethylhexyl] phthalate (BEP), butyl benzene phthalate, and polychlorinated biphenyls (PCBs). In addition, non-aqueous phase liquid (NAPL) seeps have been found at the head of the Thea Foss Waterway. The most severely contaminated sediments at Hylebos Waterway had high concentrations of several chlorinated organic compounds (including

PCBs, pesticides, hexacholorbenzene and hexachlorobutadiene), HPAHs, LPAHs, lead, copper, zinc, mercury, and arsenic. Mercury and copper were identified as indicator chemicals of severe sediment contamination in Middle Waterway.

B. Commencement Bay Nearshore/Tideflats Record of Decision

The Commencement Bay site has been divided into smaller project activities, called operable units (OU), in order to more effectively manage the overall cleanup of the site. In the 1989 ROD, EPA designated two operable units for the cleanup of the nearshore/tideflats portion of Commencement Bay: source control (OU 5), which focuses on efforts to control upland discharges or releases to the Bay; and sediment remediation (OU 1), which addresses the cleanup of the contaminated marine sediments in Commencement Bay. The Washington Department of Ecology is the lead agency for source control and EPA is the lead agency for sediment remediation. OUs 2-4 and 6 address contamination at geographically separate areas at the former ASARCO smelter and Tacoma Tarpits.

In the ROD, EPA selected a remedial action for eight of the nine sediment problem areas identified through the RI/FS process as being the most significantly contaminated areas. These problem areas are: 1) Mouth of Hylebos Waterway, 2) Head of Hylebos Waterway, 3) Sitcum Waterway, 4) St. Paul Waterway, 5) Middle Waterway, 6) Head of Thea Foss Waterway, 7) Mouth of Thea Foss Waterway, and 8) Wheeler-Osgood Waterway. The ninth problem area, off-shore of the ASARCO smelter (OU 6), is being addressed in a separate ROD. To date, remedial actions consistent with the CB/NT ROD have been completed at the Sitcum and St. Paul waterways. (The St. Paul Waterway cleanup occurred at a different location than the St. Paul Nearshore Fill selected in this ESD.)

The cleanup objective for the remedial action, as described in Section 10 of the 1989 ROD, states that "the selected remedy is to achieve acceptable sediment quality in a reasonable time frame." "Acceptable sediment quality" is defined as "the absence of acute or chronic adverse effects on biological resources or significant human health risks". The ROD designated biological test requirements and associated sediment chemical concentrations referred to as sediment quality objectives (SQOs) to attain the cleanup objective for the CB/NT site. The PCB SQO was subsequently updated in a 1997 ESD. Habitat function and enhancement of fisheries resources were also identified as overall project cleanup objectives.

The ROD selected a remedy comprised of five key elements: site use restrictions (now commonly referred to as institutional controls), source control, natural recovery, sediment remedial action (i.e., confinement and habitat restoration), and monitoring, to address contaminated sediments in the waterways of the CB/NT site.

The ROD noted that institutional controls would consist primarily of public warnings to reduce potential exposure to site contamination, particularly of contaminated seafood. The

Tacoma/Pierce County Health Department has installed signs at several locations in the CB/NT waterways providing warnings in several languages against eating seafood caught there.

The objectives under source control are to control major sources of contamination to the waterways prior to implementation of active remediation in the waterways and to monitor source control effectiveness both prior to and after completion of sediment remedial action.

For marginally contaminated areas expected to recover naturally to the SQOs within 10 years after sediment remedial action, the ROD calls for natural recovery. For areas that are not expected to recover within a 10-year time frame, the ROD specified that active remediation of problem sediments would be accomplished by utilizing a limited range of four confinement technologies. These technologies are in-place capping, confined aquatic disposal, nearshore disposal, and upland disposal.

Long-term monitoring of the remediated areas, including disposal sites and habitat mitigation areas, is also a component of the remedy. Monitoring will be conducted to evaluate the effectiveness of the remedy in achieving SQOs and in achieving the habitat functions that are called for in the mitigation plans.

C. Analysis of Treatment Technologies

The ROD also concluded that the selected remedy described above represented the maximum extent to which permanent solutions and treatment technologies could be utilized in a cost-effective manner at the CB/NT site. To determine whether the ROD's conclusion about treatment technologies was still valid at this time, EPA Region 10 asked EPA's National Risk Management Research Laboratory in Cincinnati, Ohio to review site-specific data that have been generated at the three waterways since the ROD, and to provide Region 10 with an opinion about the viability and cost-effectiveness of currently available treatment technologies.

EPA's conclusion is that while some new treatment technologies are available, most are still in the pilot stage, and all would be more expensive than the most expensive confined disposal option, upland disposal. The wide-spread, low level sediment contamination present in much of Commencement Bay is not the optimal scenario for applying a treatment technology, which generally works best when applied to low volume, highly concentrated waste. At this time, containment remains the best option for the contaminated sediments being addressed under the 1989 ROD and this ESD.

Treatment may be used, however, to address localized "hot spot" areas in the Hylebos and Thea Foss waterways. This includes some of the contaminated materials found near the former Occidental Chemical facility on the Hylebos Waterway, which is being addressed under a separate CERCLA response action (see Section V), and potentially NAPL at the head of the Thea Foss Waterway. In general, NAPL is considered a "principal threat" source material. EPA expects that treatment be used to address principal threats wherever practicable. The decision to treat

principal threat materials, however, is made on site-specific basis. EPA has determined that containment is the most appropriate option for the NAPL at the head of Thea Foss Waterway. Some NAPL, however, will be excavated as needed for construction of the cap and may require treatment prior to disposal (see Section V). The need for treatment prior to disposal will be determined by further testing during the remedial design phase.

III. DESCRIPTION OF AND BASIS FOR THE SIGNIFICANT DIFFERENCES

A. Introduction

The CB/NT ROD sets forth a general cleanup approach for the waterways that comprise the CB/NT site and identifies, based on RI/FS sampling data, problem areas requiring response action. Since then, pre-remedial design studies at the individual waterways have better defined the area and volume of sediment exceeding the SQOs, and identified specific areas to be dredged or capped, as well as areas where natural recovery would be appropriate. In addition, the post-ROD studies helped EPA identify which disposal sites (nearshore, in-water, and upland) would be most appropriate to safely contain dredged sediments.

Consequently, this ESD documents the following changes:

a) the size of the problem areas and the volume of sediment to be dredged,
b) institutional controls related to contaminated sediments contained on-site,
c) addition of an option to use a thin layer of clean material to allow marginally contaminated sediments to naturally recover, (i.e. "Enhanced Natural Recovery"),
d) additional specificity of remedial actions for the Thea Foss, Wheeler-Osgood, and Hylebos waterways,
e) elaboration of performance criteria for the cleanup plans,
f) inclusion of the Endangered Species Act (ESA) as an applicable, or relevant and appropriate, requirement (ARAR) for remedial actions under the ROD, and
g) the cost of the remedial action.

While these are significant changes, the cleanups that are described in this ESD are fundamentally consistent with the remedy set forth in the 1989 ROD. The ROD selected natural recovery or confinement as the primary methods for addressing contaminated sediments at the CB/NT site. This ESD identifies natural recovery areas and the areas that require dredging and confinement or capping. The ROD also set forth the types of disposal sites that may be suitable to contain contaminated sediments. Consistent with the ROD, this ESD identifies the locations that will be used as disposal sites. None of the significant differences discussed below fundamentally alter the remedy selected in the ROD.

B. Volume

The ROD recognized that the estimated volume of sediments needing active remediation (i.e., confinement via dredging and disposal or in-situ capping) would be refined during the remedial design phase and that both volume and costs "are anticipated to change accordingly." Since the ROD was signed, additional investigations and studies were undertaken by the potentially responsible parties (PRPs) at each of the three waterways. Those studies have resulted in the identification of higher volumes of sediment that are the subject of remedial action than was originally estimated in the ROD. The increase in contaminated sediment volumes is due to: 1) extensive remedial design sampling, which showed larger areas of contamination than were identified during the limited RI/FS sampling effort; and 2) refinement of natural recovery models in the design phase, which showed a smaller area would achieve SQOs over 10 years through natural recovery than had been estimated during the RI/FS. A comparison of the volume estimates in the ROD with the refined volume estimates in this ESD is provided in Table 1.

Table 1. Comparison of 1989 ROD and 2000 ESD volume estimates

	1989 ROD volume estimate	**2000 ESD volume estimate**
Hylebos	448,000 cubic yards (cy)	940,000 cy*
Middle	57,000 cy	75,000 cy
Thea Foss/Wheeler Osgood	437,000 cy	620,000 cy
Total	**942,000 cy**	**1,635,000 - 1,835,000 cy**

*Confined disposal of an estimated additional 120,000 cy may be needed if additional navigational dredging by the U. S. Army Corps of Engineers (Corps), the Port of Tacoma, and private parties is conducted (see Section V).

In addition to the disposal volumes for the Thea Foss Waterway, 32 acres will be capped; 4 acres will receive a minimal cap to enhance natural recovery; and 21 acres will be monitored to confirm that natural recovery is achieving sediment quality objectives in the required 10 year time frame. At the Hylebos Waterway, the estimated disposal volume includes 11.6 acres in isolated intertidal or under dock/structure areas. If the remedial design shows that those areas can be capped, it would reduce the disposal volume from 940,000 cy to 845,000 cy. Twenty (20.7) acres are identified as natural recovery areas. Refinement of dredge volumes and estimates of capping and natural recovery areas for Middle Waterway will be addressed in a separate ESD.

C. Institutional Controls

The 1989 ROD noted that institutional controls would consist primarily of public warnings to reduce potential exposure to site contaminants, particularly contaminated seafood. Informational and advisory controls, such as fishing and fish consumption notices will continue to be used as long as it takes for fish to lose their contaminant body burdens or be replaced by younger, healthy fish that have not been exposed to contaminants.

To increase the long-term protectiveness of the waterway cleanups, institutional controls are required to meet the following objectives:

1. reduce potential exposure of marine organisms to contaminated sediments disposed of and confined in aquatic disposals sites or confined by capping; and
2. reduce potential exposure to marine organisms to contaminated sediments left on the CB/NT site.

The ROD anticipated that other regulatory programs would address contaminated sediment exposed due to navigational dredging or dredging conducted for development purposes, such as permitting requirements under Section 404 of the Clean Water Act and the state Shoreline Management Act. Thus, institutional control mechanisms that will be used to achieve the objectives stated above include governmental controls, such as local, state, and federal regulatory permitting/approval processes for dredge and fill projects in the waterways, city zoning ordinances that limit site use, or other types of governmentally required best management practices regarding maintenance activities in the waterway and removal and placement of in-water pilings. Additionally, parties constructing and maintaining the disposal sites must agree to maintain the disposal sites so as to prevent contaminated sediments from migrating or becoming exposed. Owners and/or operators of any disposal sites must ensure that any uses made on the top of the disposal site will not disturb the integrity of the disposal site or cause or contribute to the exposure of contaminated sediments to the environment. Other institutional controls may be used on a property-specific basis if determined necessary and feasible, including proprietary controls relying on real property interests, such as environmental easements and land use restrictions.

D. Natural Recovery and Enhanced Natural Recovery

The ROD identified natural recovery as an important component of the overall remedy. The expectation is that in some areas, the natural processes of sedimentation, chemical degradation, and surface sediment mixing due to bioturbation will allow contaminated sediments to recover to SQOs within 10 years after cleanup. Areas with marginally contaminated sediments that were expected to recover naturally to SQOs within 10 years after sediment remedial action would be initially exempt from sediment remedial action. Monitoring to confirm the long-term effectiveness of natural recovery is required under the ROD, and the need for active sediment remediation will be reconsidered if subsequent monitoring data indicates that natural recovery is not viable in a reasonable timeframe.

In this ESD, EPA is adding a component to help accelerate the natural recovery process. In certain locations, natural recovery will be enhanced through the application of a thin layer of clean material in specific areas of marginal contamination. This method is being referred to as Enhanced Natural Recovery. The application of minimal volumes of clean material speeds up the natural sedimentation at the outset and enhances the recovery of bottom-dwelling animals in surface sediments, which aids in building a larger base of clean material that will cover the marginally contaminated sediments.

E. Disposal Sites

The ROD did not select specific disposal sites for contaminated sediments. This ESD selects two in-water disposal sites (St. Paul Nearshore Fill, and Blair Slip 1) and upland disposal in a regional landfill, consistent with the four confinement options considered acceptable under the ROD. See Section VI.

F. Specific Cleanup Plans for the Thea Foss, Wheeler-Osgood, and Hylebos Waterways

Consistent with the ROD, this ESD describes the specific cleanup plans for Thea Foss, Wheeler Osgood, and Hylebos waterways. See Section V.

G. Performance Criteria for the Cleanup Plans

Consistent with the ROD, this ESD describes the specific performance criteria that the cleanup plans must meet to ensure that the cleanup is protective of human health and the environment. See Section IV.

H. Protection of Endangered Species

ESA is an action-specific and location-specific ARAR for the response actions under the ROD. The recent listing of Puget Sound chinook salmon and bull trout as threatened species under ESA has emphasized the need for EPA to work with the National Marine Fisheries Service (NMFS), the U.S. Fish and Wildlife Service (USFWS), the other natural resource agencies, and Native American tribes to evaluate habitat impacts and habitat enhancement opportunities on a bay-wide basis.

Conservation and recovery of listed species has been an important consideration in approving cleanup plans and selecting disposal sites. Consistent with the ROD cleanup goal of enhancing habitat function and fisheries resources, EPA, Washington Department of Natural Resources (DNR), and the City of Tacoma hired a fisheries biologist from the University of Washington to conduct a bay-wide habitat assessment, *Commencement Bay Aquatic Ecosystem Assessment* (Simenstad, 2000). The assessment, discussed in Section IV.F., identifies habitat concerns associated with in-water disposal sites and incorporates effective salmon recovery components into EPA's cleanup decisions. These components have been incorporated into EPA's requirements for mitigation under Section 404 of the Clean Water Act.

EPA has prepared a biological assessment of the impacts the remedial actions in this ESD will have on the threatened or endangered species and has submitted it to NMFS and USFWS. The assessment is also included in the administrative record for this ESD. EPA's assessment has concluded that performance of the remedial actions together with all of the mitigative measures that will be required is not likely to jeopardize the continued existence of any federally listed or threatened or endangered species or result in the destruction or adverse impacts to critical habitat

for these species. EPA will continue to consult with NMFS and USFWS on these cleanup plans. The consultation process may result in adjustments to mitigation plans and remedial action plans to ensure protection of endangered species and their habitat during the construction of the remedy.

I. Costs

The 1989 ROD provide a range of cost estimates for dredging contaminated sediments and disposal by confined aquatic disposal, nearshore disposal, or upland disposal. Table 2 provides a comparison of the cost estimates in the 1989 ROD to the estimates for implementing the remedial actions outlined in this ESD.

Table 2. Comparison of cost estimates in the 1989 ROD and the 2000 ESD

	1989 ROD cost estimate ($ million)	**2000 ESD cost estimate ($ million)**
Hylebos Waterway	$10.7 - $30.9	$46.1
Thea Foss/Wheeler Osgood	$8.89 - $26.7	$35
Middle Waterway	$2.66 - $7.47	no new estimate

The original ROD cost estimates were based on a smaller volume of sediment to be dredged, as shown in Table 1. The low end of the 1989 ROD cost range represents disposal in a nearshore fill that was associated with a permitted development project. There are some differences in the assumptions used to develop cost estimates in the 1989 ROD and in this ESD. For example, the ROD assumed that site preparation costs for nearshore fills would be absorbed by the developer of the commercial development project. In this ESD, cost estimates include the larger, estimated volume of sediments that require remedial action, and the cost of disposal in the selected disposal sites, including site preparation costs. For both the St. Paul Nearshore Fill and Blair Slip 1 disposal sites, the fill projects would create additional upland property, which will be beneficially used by the landowners. Economic benefits from development of new upland properties have not been taken into account in these cost figures.

For the purposes of providing cost estimates, EPA has assumed that Thea Foss and Wheeler Osgood sediments will be disposed of in St. Paul Waterway and Hylebos Waterway sediments will be disposed of in Blair Slip 1 and the Upland Regional Landfill, based on cleanup options developed by the Thea Foss and Hylebos PRPs. EPA supports this mix but reserves the flexibility to allow the PRPs to make adjustments during design based on final disposal capacity, volumes, and timing. Also, as noted in Section VI (Disposal Sites), EPA will continue to explore expanding the capacity of both the Blair Slip 1 and St. Paul Waterway disposal sites, and using contaminated sediments as upland industrial fill, which if implemented, would lower the volume of sediments requiring disposal in a regional landfill and be expected to reduce cleanup costs. Current cost estimates based on increased volumes of sediment to be dredged are provided in

Appendix A and are summarized below. Costs for Middle Waterway will be refined in a separate ESD.

Hylebos Waterway

Total remediation cost is estimated at $46,137,000 for dredging 940,000 cy of contaminated sediments from the Hylebos Waterway and disposing of 640,000 cy at the Blair Slip 1 disposal site and 300,000 cy at an Upland Regional Landfill. Cost estimates do not include land acquisition or leasing costs that may be related to use of Blair Slip 1 or with dewatering facilities associated with upland disposal. Detailed cost estimates are provided in the Hylebos Pre-Remedial Design Evaluation Report (1999), and in Appendix A of this ESD.

Thea Foss and Wheeler-Osgood Waterways

Total remediation cost for the Thea Foss and Wheeler-Osgood waterways is projected at $35,000,000. Detailed cost estimates are provided in Appendix N-9 of the "Round 3 Data Evaluation and Pre-Design Evaluation Report"and in Table A-3 of this ESD. These detailed cost estimates include the cost of a slurry wall at the head of the Thea Foss waterway, which has been excluded from EPA's selected remedy. Exclusion of the slurry wall reduces the cost from $35.9 to approximately $35 million.

A significant proportion of the total cost is attributed to remediating the head of the Thea Foss (from approximately the SR-509 bridge to the south end of the waterway). If the City's approach for remediation cannot meet specific performance criteria as discussed below then the remedy for the head of the waterway may need to be modified. Modifications may include additional source removal and/or alteration of the cap design or other possible modifications. Consequently, the remediation costs for the head of Thea Foss Waterway may change and thereby result in changes to the total remediation costs.

The following sections IV-VII provide further detail on performance criteria, the specific cleanup plans for Thea Foss, Wheeler-Osgood, and Hylebos waterways, the selected disposal sites for dredged contaminated sediments, and the status of source control actions.

IV. PERFORMANCE CRITERIA FOR THE REMEDIAL ACTIONS

While this ESD describes the remedial actions for the individual waterways with some degree of specificity, remedial design will further refine the details of the remedial actions that will be implemented in the individual waterways. In this ESD, EPA is setting forth performance criteria to be applied for the design and implementation of the cleanup. These performance criteria are consistent with the fundamental cleanup objectives set forth in the ROD and are necessary to ensure that the remedy is protective of human health and the environment, and complies with ARARs. Additional performance criteria will be identified during remedial design.

A. Cap Requirements

One of the remedial actions selected in the 1989 ROD and in this ESD is capping. EPA intends to maintain the integrity and effectiveness of caps over contaminated sediments through requirements for construction, long-term monitoring, and maintenance, including the following:

1) Caps will have a minimum thickness of three feet and will be constructed to address adverse impacts through four primary functions:
   a) Physical isolation of the contaminated sediment from the ecological receptors;
   b) Stabilization of contaminated sediments, preventing resuspension and transport to other locations within the waterway;
   c) Reduction of contaminants transported through the groundwater pathway to levels that will not recontaminate surface sediments (defined as the "biologically active zone" where most sediment-dwelling organisms live) above the SQOs or adverse biological effect levels, or contaminate surface water at levels exceeding background concentrations or marine chronic water quality criteria;
   d) Provide a cap surface that promotes colonization by aquatic organisms.

2) Long-term monitoring of the cap will include, as appropriate, visual inspection, bathymetric survey, sediment deposition monitoring, chemical monitoring, and biological monitoring.

B. Dredging and Confined Disposal

Performance standards for dredging and confined disposal will be consistent with Clean Water Act and Rivers and Harbors Act requirements. Specific details will be developed during project design. Both the remediated waterways and the disposal sites will be subject to long-term monitoring to ensure that the selected remedy remains protective, including monitoring to ensure that surface sediments do not become recontaminated in the remediated waterways, and that marine chronic water quality standards or background concentrations are not exceeded in surface water outside of the confined disposal sites.

C. Natural Recovery and Enhanced Natural Recovery

Natural recovery or enhanced natural recovery is an acceptable remediation approach at locations where sediments are marginally contaminated and are likely to recover to cleanup levels within the 10 year time frame specified in the ROD. At the CB/NT site, EPA considers marginally contaminated sediments as those with chemical concentrations less than the second lowest Apparent Effects Threshold (AET) value (the SQO is set at the lowest AET) or biological test results that do not exceed the minimum cleanup level (MCUL) values under Washington State Sediment Management Standards. Leaving highly contaminated sediments unaddressed for 10 years after remedial action would create an unacceptable short-term environmental risk, even if these sediments are predicted to naturally recover.

Areas selected for natural recovery (including enhanced natural recovery) will require: (1) monitoring plans, (2) triggers for initiating contingent actions if the monitoring indicates natural recovery will not succeed in the 10 year time frame, and (3) contingent plans for active remediation if monitoring in interim years indicates natural recovery will not occur by year 10.

D. Subsurface Contamination

In some areas where the surface sediments meet "no action" or natural recovery criteria, subsurface sediments are significantly contaminated at depth. The ROD states that SQOs must be met at the time of cleanup (or in 10 years, for natural recovery areas) and in the long-term. In order to meet SQOs in the long term, subsurface sediments must either meet SQOs or be isolated from the surface. Exposure of contaminated subsurface sediments may occur during the cleanup by dredging adjacent areas, through physical processes, such as storms or ship scour, or through future dredging or excavation. In order for subsurface contamination to remain in place, it must either be present at such low levels that it would not present a risk if it were exposed, or it must have a very low potential for exposure. These criteria have been applied in selecting the cleanup plans included in this ESD. These criteria must continue to be applied throughout the design and construction phases of the remediation. If contaminated sediments must be disturbed, for example, to accommodate a new future use, they must be handled in an environmentally responsible fashion and the newly exposed surface must meet SQOs. Either existing regulatory programs or other specific institutional controls described in this ESD will be used, as appropriate, to ensure that SQOs are met.

E. Source Control in the Thea Foss Waterway

Toward the head of the Thea Foss Waterway, municipal stormwater discharges, marinas and highly contaminated subsurface NAPL, both in the waterway and in adjacent uplands, pose a risk of recontamination of surface sediments above SQOs. If further source control actions are not taken, BEP and PAHs are predicted to recontaminate sediments in the waterway after sediment cleanup.

Ecology is working with various parties to complete source control actions in upland areas around the head of the waterway including the area near the west bank NAPL seep. This work is being done under the Model Toxics Control Act (MTCA) and the Clean Water Act.

In the "Round 3 Data Evaluation and Pre-Design Evaluation Report, Appendix U," the City of Tacoma recommended a specific in-water remedial action for the head of the Thea Foss Waterway to address the in-water NAPL contamination and seeps. Based on a subsequent technical memorandum, (Technical Memorandum from Hart Crowser to Mary Henley, City of Tacoma, dated June 14, 2000) the City of Tacoma modified their recommended approach.

The City's modified approach for remediation is acceptable to EPA. In the design phase and prior to remedial action, however, the following specific performance criteria for source control and the remedy for the head of the waterway must be met to eliminate or reduce the potential for

recontamination from storm drains as well as from the NAPL beneath the sediments and in adjacent uplands.

1) An approved stormwater action plan which includes, at a minimum, the following:
   a) an Ecology-approved stormwater sampling and analysis plan which will complete the Stormwater Management Plan for Thea Foss as required under the general NPDES permit,
   b) a phthalate study for determining possible phthalate sources to the Waterway,
   c) pilot testing to determine the contribution of dissolved versus particulate contaminant loading to the Waterway,
   d) an evaluation of stormwater structural controls, and
   e) an implementation schedule for the above stormwater studies, plans and controls.

2) A final remedial design based on modeling and treatability studies, and other appropriate studies, that conclusively determine that NAPL in the waterway will be stabilized and prevented from migrating to other portions of the waterway and from recontaminating surface sediments. In addition to the cap performance requirements discussed at Section IV.A. above, the sorbent cap must at a minimum also meet the following requirements:
   a) The final design of the cap must demonstrate that hydraulic control can be achieved in order to prevent remobilization of NAPL within the waterway.
   b) The final design must demonstrate that it prevents recontamination from any source material below the cap.
   c) The cap must require minimal maintenance.
   d) NAPL stabilization should include removal of contaminant source material where necessary for effective confinement.

EPA will require additional source removal and/or modification of the cap design if these performance criteria cannot be met by the City's remedial design and implementation.

F. Mitigation

Throughout pre-remedial design planning, EPA has identified all appropriate and practicable steps to avoid short- and long-term unacceptable adverse impacts to the Commencement Bay aquatic environment. All appropriate measures will be taken during remedial design, construction, and site maintenance to continue to avoid and minimize adverse impacts. Such measures that will be required by EPA include, but are not limited to, avoidance of fish-critical activity periods for in-water work, incorporation of "best-design" features and/or materials into remedial and compensatory mitigation plans that protect or enhance ESA-listed species, and creation or restoration of critical salmonid habitat. Additionally, EPA will require detailed compensatory mitigation plans to offset loss and other impacts to aquatic habitat and meet ESA responsibilities.

In assessing suitable compensatory mitigation measures, EPA has and will continue to rely upon the framework for the Commencement Bay-wide conservation and recovery strategy in the *Commencement Bay Aquatic Ecosystem Assessment* (Simenstad, 2000), along with data developed during consultation with NMFS and USFWS. The strategy of the Simenstad report focuses on broad landscape attributes and ecosystem processes (i.e., landscape ecology) that promote juvenile salmon utilization of existing and potential Puyallup River delta and Commencement Bay habitats. While the report does not specify or set priorities on discrete actions, it does identify criteria to guide selection of sites and actions. It is EPA's intent that remediation, including required compensatory mitigation, of the CB/NT site cumulatively contribute toward the recovery of ESA listed species. Drawing from the Simenstad report, EPA has identified the following "performance criteria" that must, at minimum, be addressed in any acceptable compensatory mitigation plan:

1) All compensatory mitigation must be consistent with the criteria and findings of the Simenstad report.
2) Preference will be given to compensatory mitigation plans that are consistent with habitat function prioritization criteria[1] (to be determined).
3) All compensatory mitigation plans will include an assessment of how they contribute toward recovery.
4) Mitigation plans must include consideration for connectivity (i.e., habitat that is linked or capable of being linked to other habitat and is intended to avoid mitigative actions that are geographically isolated and underutilized by the target species and/or do not reach full function).
5) Compensatory mitigation sites will be located within or will provide connections to or between one or more of the critical areas of "salmon landscape" (e.g., osmoregulatory transition) described by the Simenstad report within the Commencement Bay and lower Puyallup River watershed.
6) The aspect of *risk* of mitigation success/failure must be specifically factored into habitat plans and provided for up-front rather than solely as a post-construction contingency (i.e., in most cases this will mean additional habitat acreage).
7) All compensatory mitigation plans will include measurable performance objectives, management, monitoring and reporting requirements, responsibilities, and schedule.
8) Native species only will be utilized in any plantings to the maximum extent practicable.
9) Mitigation plans should include facility design and site plans for any development/redevelopment that occurs as a result of a fill. The facility and site

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[1] The Simenstad report identifies "several emerging "visions" on broad-scale restoration of the delta-Bay" (p. 3) as well as efforts for upriver restoration (p. 9). The report also identifies a number of parcels or groups of parcels as potential sites. No prioritization of those opportunities has occurred to date. EPA will prioritize preferred habitat functions after consultation with the Services, resource agencies, and the Tribes.

plans must ensure that the facility and site characteristics and functions do not create adverse impacts to water, sediment and habitat quality during construction and operation. For example, the site plan for the expanded Simpson facility should include on- and off-site stormwater treatment; beneficial use of relatively clean stormwater (e.g. rooftop runoff, treated stormwater etc.); lighting and noise impacts minimization, including buffering; and other site-specific best management practices.

Compensatory mitigation plans will be developed pursuant to these performance criteria and in consultation with EPA and resource agencies, and be submitted to and approved by EPA during the remedial design phase. EPA may consider mitigation proposals that do not meet all of the performance criteria if the PRPs demonstrate that the proposal is otherwise consistent with the Simenstad report or otherwise significantly contributes to conservation and recovery of ESA listed species.

None of the compensatory mitigation plans submitted to date have been approved by EPA at this time. In addition, 4.6 acres of intertidal habitat within Thea Foss Waterway and 2.7 acres of intertidal habitat within Hylebos Waterway will be lost due to planned remediation in those waterways and have not been accounted for in any of the compensatory mitigation plans or documents provided to EPA. See Section V., *Habitat Considerations* subsections for Thea Foss and Hylebos waterways for more detail on habitat loss from the cleanup plans.

V. DESCRIPTION OF THE IN-WATERWAY REMEDIAL ACTIONS

A. Thea Foss and Wheeler-Osgood Waterways

In March 1994, the City of Tacoma entered into an Administrative Order on Consent (AOC) with EPA to conduct the design of the remedial action for the Thea Foss and the Wheeler-Osgood waterways. The City has analyzed previous data, conducted additional studies regarding the nature and extent of contamination in the waterways, and prepared a pre-design evaluation. The studies and evaluations to date include the following:

a) three rounds of sampling,
b) a feasibility study to evaluate cleanup actions for NAPL seeps located at the head of the Thea Foss Waterway,
c) an evaluation of potential disposal sites for dredged contaminated sediments,
d) an evaluation of the potential for sediment recontamination after cleanup, and
e) an underwater survey at the head of the waterway to locate the source of NAPL seeps beneath the SR 509 bridge.

These studies and evaluations are contained in the following reports which have been reviewed by EPA and placed in the Administrative Record:

a) Round 1 Data Evaluation Report. Thea Foss and Wheeler-Osgood Waterways. Tacoma. Washington. May 30. 1995.
b) Screening of Remedial Options Report. Thea Foss and Wheeler-Osgood Waterways. Tacoma. Washington. November 15. 1996.
c) Round 2 Data Evaluation Report. Thea Foss and Wheeler-Osgood Waterways. Tacoma. Washington. January 17. 1997.
d) Round 3 Data Evaluation and Pre-Design Evaluation Report. Thea Foss and Wheeler-Osgood Waterways. Tacoma. Washington. September 30. 1999.
e) SSMA 7 Technical Update. Memorandum from Hart Crowser to the City of Tacoma . dated June 14. 2000.

The areas within the waterways that require cleanup have been identified. The Thea Foss and Wheeler-Osgood waterways have been organized into Superfund Sediment Management Areas (SSMAs). There are seven SSMAs and they are depicted in Figure 2. The studies that have been completed indicate that the most severe contamination at surface and at depth occurs in segments 6 and 7 and tapers off gradually towards the Mouth of Thea Foss in segments 2 and 1. Primary contaminants found throughout the waterways that require cleanup both at surface and subsurface are BEP and PAHs. Other contaminants, such as metals are more localized. The head of the waterway (SSMA 7) contains deposits of NAPL beneath the sediments. This NAPL presents an ongoing source of conatmination to the waterway via seeps that transport the NAPL to the surface sediments.

Except for SSMA 1, substantial active remediation is needed to achieve cleanup objectives. The following paragraphs describe EPA's remediation plan for Thea Foss and Wheeler-Osgood waterways that is consistent with the remedial action EPA selected in the ROD. EPA's remediation plan is similar to the City of Tacoma's preferred alternative. Alternative 5B. described in the "Round 3 Data Evaluation and Pre-Design Evaluation Report" and in a subsequent technical memorandum. However. EPA's selected remedy for SSMA 7 includes a contingency for additional source removal and/or modification of the cap design if the established performance criteria cannot be met by the City's remedial design and implementation. EPA's remedy also differs from the City's in that it designates some additional areas for either natural recovery or enhanced natural recovery. EPA's remedy is described below.

SSMA 1 (Station 0+00 to 20+00)

No action is required in most of this segment except for SSMAs 1e1 and 1e2. where a cap will be placed to ensure that an area of sediments contaminated with hexachlorobenzene is remediated.

The approximate capping volume required to remediate this area is 15,000 cy of clean material. The remedial action will maintain the current navigable elevation of at least -29 feet MLLW.

SSMA 2 (Station 20+00 to 35+00)

The majority of sampling locations in this segment of the waterway indicate that chemical exceedances are marginal. EPA is requiring natural recovery at those areas where marginal exceedances occur because minor adverse biological effects were predicted for these areas in the City's Round 2 Report. These areas are SSMAs 2b1, 2b3, 2c1a, and 2c1b. In addition, a few discreet areas within SSMA 2 require either capping or dredging. SSMA 2a2 which is adjacent to an upland bank will be capped. Other areas, such as SSMA 2b4 and 2b5 will be dredged approximately four feet to remove all contaminated sediments. While this will eliminate the need for a cap, these areas will be backfilled with clean material to the approximate elevation of surrounding areas.

The estimated total volume for dredging and capping/backfilling this segment is approximately 16,000 cy and 15,000 cy, respectively. The remedial action will maintain the current navigable elevation of -29 feet MLLW.

SSMA 3 (Station 35+00 to 46+40)

The majority of areas within SSMA 3 have SQO exceedances that require removal and/or capping. SSMAs in the navigation channel between the 11th Street Bridge and the 15th Street right of way (ROW) (SSMAs 3b1, 3b2, 3b3, 3b4, 3b5a, and 3b5b) will be dredged to a specified elevation of -32 feet MLLW (elevation -30 feet MLLW with a 2-foot over dredge allowance) to remove all contaminants. Post-dredge samples will be taken to assess chemical concentrations of the dredged surface. If necessary, further dredging and/or some amount of capping may be required. Non-channel areas will undergo a combination of cleanup actions, including no action, natural recovery, capping, and dredging. SSMA 3a1 requires no action based on existing conditions. SSMAs 3a2 and 3a3 are suitable for natural recovery. SSMA 3c1 will undergo a combination of cleanup actions including natural recovery, enhanced natural recovery, dredging and capping. SSMA 3c2 and 3d are areas suitable for capping.

The estimated capping volume for this segment is in excess of 23,000 cy; the dredging volume is approximately 206,000 cy. The navigation channel along this section is authorized to an elevation of -22 feet MLLW. As the channel will be dredged to -32 feet MLLW, this remedial action meets navigation requirements.

SSMA 4 (Wheeler-Osgood Waterway)

Chemical exceedances in this segment indicate that active remediation needs to occur in two main areas: SSMAs 4a and 4c. These areas will be dredged to remove contaminated sediments. It is expected that all contaminants will be removed. The City's studies suggest that dredging SSMA 4a four feet will remove all contaminants. It is expected that SSMA 4c will be dredged to an elevation of -8 feet MLLW (which includes 1 foot of over dredge) to remove all contaminants. This area will then be capped/backfilled to match the current bathymetry for habitat benefits. Approximately 5,000 cy and 22,100 cy will be dredged from SSMAs 4a and 4c, respectively.

In addition, the City of Tacoma recommended no action areas where there are chemical exceedances of the SQOs. EPA requires that these areas be designated as natural recovery areas. If long-term monitoring indicates these areas will not achieve SQOs within 10 years after remedial action, they must be remediated.

The total volume of dredge material from SSMA 4 will be approximately 27,000 cy. The total amount of cap/backfill material needed for SSMA 4 will be nearly 20,000 cy. The Wheeler-Osgood Waterway is not part of the navigation channel. Current elevations will be maintained.

SSMA 5 (Station 46+40 to 52+40)

The navigation channel along this section is divided into two authorized navigation elevations. Between the 11th Street Bridge and the 15th Street ROW, the navigation channel is authorized to an elevation of -22 feet MLLW. From the 15th Street ROW to Station 52+40, the navigation channel is authorized to an elevation of -19 feet MLLW. These areas (SSMAs 5b1, 5b2a, 5b2b, 5b3a, 5b3b and 5b4) will be dredged to a specified elevation of -32 feet MLLW (which includes 2 feet of over dredge) to remove contaminants. It is expected that dredging to this depth will remove all contaminants.

Areas outside of the navigation channel will have a combination of remedial actions, including no action, natural recovery, capping, and dredging. Although SSMAs 5a1 and 5a3 will require no action based on existing conditions, a portion of these SSMAs will be dredged as part of the channel slope. The portions of the bank that the City recommended as no action areas have chemical exceedances of the SQO for copper and zinc; therefore, EPA requires that these areas be remediated either through capping or dredging because banks are not suitable for natural recovery. SSMAs 5c and 5a2, which are located along the channel slope, will be partially dredged. Caps will completely cover these SSMAs to confine remaining contaminants.

The remedial actions in this segment will result in total dredge and cap volumes of approximately 198,000 cy and 16,000 cy, respectively.

SSMA 6 (Station 52+40 to 62+30)

The navigation channel along this section is authorized to an elevation of -19 feet MLLW, however, it will be dredged to an elevation of -24 feet MLLW. Data collected by the City suggests that in places contamination may be considerably deeper. Consequently, a cap will be placed over dredged surfaces resulting in an elevation of -21 feet MLLW which will be 2 feet below the authorized channel depth.

Non-channel areas will receive a combination of no action, natural recovery, dredging and capping. Based on existing conditions, SSMAs 6a2a and 6c will require no action. SSMAs 6a2b and 6b3, located on the east side of the waterway under the Fishing Fleet, will be dredged to an elevation of -17 feet MLLW to remove all contaminated sediments and accommodate marina

users. SMAs 6b4 and 6b5 will be dredged to an elevation of -13 feet and capped back to elevation -10 feet because there are contaminated sediments at depth.

Dredging these areas will result in more than 92,000 cy of sediment needing disposal. Capping will require approximately 58,000 cy of clean material.

SSMA 7 (Stations 62+30 to 72+40 and 77+50 and 80+00)

Contamination in this segment of the waterway is deep and in excess of the authorized navigation depth of -19 feet MLLW. Sediments in SSMA 7b2 within the navigation channel between Stations 62+30 and 68+00 will be dredged to elevation -26 feet MLLW (elevation -24 feet including 2-foot over dredge). This will result in a channel approximately 5 feet below the required channel depth for navigation (-19 feet MLLW) in this area. In SSMA 7b3a, the dredge cut within the navigation channel will taper from -26 feet MLLW at Station 72+00 to -13 feet MLLW near Station 72+40. A cap will be required throughout this area because the majority of sediments at this depth and deeper contain chemical concentrations above SQOs. Following placement of the cap, the mudline elevation will be 2 feet below the authorized channel depth up to Station 72+00 and taper to a final elevation of -10 feet MLLW near Station 72+40.

Non-channel areas including SSMAs 7a and 7b1 (located on the east side of the waterway) will be dredged to an elevation of -13 feet MLLW to provide room for potential marinas. SSMAs 7c, 7d1 and 7d2 will be dredged to an elevation of -13 feet and capped back to an elevation of -10 feet as contaminated sediments exist at depth at these locations.

EPA is selecting the approach recommended by the City of Tacoma for remediation and control of the NAPL at the head of the waterway (approximately from Station 72+00 to 80+00) provided performance criteria specific to source control are met prior to implementation of the remedy. The remedy for the head of the waterway includes the following:

a) Placement of a composite multilayered cap which may consist of sand, sorbent material and geotextile membrane over areas that have active NAPL seeps, to cap and contain those seeps. (The cap must meet the performance requirements described in Section IV. A. and E. above.)

b) Dredging of sediments (some of which may be heavily contaminated with NAPL) as needed for construction of the cap.

c) The appropriate treatment and/or off-site disposal of the contaminated sediments as determined by testing.

d) Placement of at least 3-foot thick sand caps in areas which do not have composite capping material.

f) Placement of a sheet pile wall across the waterway north of the State Route 509 bridge to provide stabilization between the cap in SSMA7 and the remainder of the navigable waterway.

Dredging the channel and slopes will result in approximately 81,000 cy of dredged sediments needing disposal. Caps will be placed throughout SSMA 7 resulting in a total cap volume of approximately 108,000 cy.

Since the post-remediation depth proposed for the head of the waterway (between the north edge of the SR-509 bridge and the head of the waterway) will be more shallow than the federally authorized navigation depth, the City of Tacoma submitted a request to the Army Corps of Engineers (Corps) on August 19, 1999, to partially deauthorize this portion of the navigation channel. Deauthorization is necessary for the cleanup at the head of the Thea Foss to substantially comply with the Rivers and Harbors Act, which is an ARAR. The Corps regional office has completed a public comment period on the deauthorization, and has forwarded its recommendation to deauthorize this portion of the channel to Corps Headquarters. After approval by the Corps, the deauthorization request will be forwarded to the Secretary of the Army and then to Congress for approval.

Thea Foss and Wheeler-Osgood Waterway Cleanup Areas and Volumes

In summary, the remediation plan for Thea Foss Waterway will result in approximate dredging and disposal volumes of 620,000 cy and approximate capping volumes of 255,000 cy. An additional estimated 25,000 cubic yards of sediment and NAPL will be dredged from the heavily contaminated area at the head of the waterway for placement of the cap. These sediments will be tested to determine the appropriate disposal option. If necessary, the sediments from the head of the waterway will be dewatered, treated and disposed off-site.

The remedial action will result in the complete dredging of approximately 24 acres; capping of approximately 32 acres (including some areas that will be dredged and then capped); natural recovery of 21 acres, enhanced natural recovery of approximately 4 acres; and no action at 37 acres.

Complete removal of contaminated sediments will occur in a substantial portion of the navigation channel specifically between the 11th Street Bridge and 15th Street. The waterway will be left deeper than -24 feet MLLW, which is 2 feet below the authorized navigational depth of -22 feet MLLW. This will allow for future maintenance dredging of the waterway. Between 15th Street and approximately station 72+00, the waterway also will be dredged to remove contaminated sediments. However, because the channel is narrow and the contamination deep, it is more difficult to remove all contaminated sediments from this part of the waterway. Therefore, after dredging, a cap of clean sediments will be placed to contain remaining contaminated sediments. In this area, the top of the cap will be left at or deeper than -21 feet MLLW which is 2 feet below the present authorized navigational depth of -19 feet MLLW.

From approximately station 72+00 to the north edge of the SR-509 bridge, there will be a transition to a capping area. As a result, there will be some dredging along this slope and placement of a confining cap. Subject to meeting the performance criteria as described above for SSMA 7, the remaining area between the north edge of the SR-509 bridge and the head of the

waterway will be capped to confine the contaminated sediments in place, leaving the channel depth in this area at an elevation of approximately -10 feet MLLW. Harbor areas that require active remediation also will be: (1) dredged to remove all contaminants, (2) dredged to a specified elevation and capped, or (3) capped. Areas near the Mouth of the Thea Foss with marginal exceedances of the SQOs will undergo natural recovery. Other areas will be capped with minimal volumes of clean material to immediately isolate marginally contaminated sediments and enhance the natural recovery process.

Habitat Considerations

Dredging and capping would sequentially eliminate non-mobile benthos over approximately 56 acres of bottom area during an estimated 1-2 years of construction. These activities, along with natural recovery, would leave a patchwork of clean to much less contaminated bottom that would be predominantly native silty sands rather than the existing, organically enriched sandy silts. The bottom sediments exposed by dredging or created by the cap fill are expected to meet SQOs and to rapidly re-colonize with infauna and epifauna. Dredging and capping would cause temporary and localized impacts to water quality in the vicinity of the active equipment during construction. In-water work would be conducted during periods when few juvenile anadromous fish are present in the nearshore waters to reduce or eliminate the risk of direct impacts to this important resource.

Remedial activities would result in a small decrease in overall area (0.21 acres) below the mean higher high water level (MHHW) due to capping of the bank areas. Total area between MHHW and elevation -10 feet MLLW would decrease by up to 4.6 acres due to dredging to remove contamination. Deeper water habitat area (deeper than -10 feet MLLW) would be increased by that same 4.6 acres, but this is judged to be an unavoidable adverse impact, which requires compensatory mitigation. Habitat quality overall should be improved throughout the two waterways because of the removal or confinement of contaminated sediment. Additionally, provision of soft or organic-rich substrates beneficial to salmonids (e.g., "fish mix" or a silt-sand mix) will be investigated for use as final capping material.

EPA will require compensatory mitigation consistent with the bay-wide mitigation and performance standards discussed in Section IV.F. to offset any loss of habitat, as well as careful timing and monitoring of dredging and capping activities to assure minimal short-term impacts and minimal disruption of migratory salmonids. The resulting substrate should greatly benefit fish and wildlife resources by removing and isolating highly contaminated sediments from biological uptake. EPA will also ensure conservation measures are taken to protect ESA listed species.

B. Hylebos Waterway

EPA and the Hylebos Cleanup Committee (HCC), which consists of ASARCO, Inc., Elf Atochem North America, Inc. (now ATOFINA Chemicals, Inc.), General Metals of Tacoma, Inc., Kaiser Aluminum and Chemical Corporation, Occidental Chemical Corporation, and the Port of Tacoma, entered into an AOC for a pre-remedial design study of the Hylebos Waterway in November

1993. Under the AOC, the HCC has collected more than 500 physical, chemical, and biological samples in two sampling rounds to characterize the nature and extent of contamination, and has developed a cleanup plan to address areas that exceed the SQOs set forth in the 1989 ROD and the 1997 ESD. The HCC also has evaluated the potential for sediment recontamination after cleanup, and has inventoried and evaluated potential disposal sites for dredged contaminated sediments.

During the course of pre-design studies, it was determined that two areas of the Hylebos Waterway should be addressed separately from the overall waterway cleanup described in this ESD, because the materials present are different than the rest of the waterway sediments. In one area, a group of wood products companies (known as the "Wood Debris Group") are working with Ecology to investigate the extent of wood debris in the turning basin at the head of Hylebos Waterway. They are also evaluating options for remediation of wood debris. Ecology's public comment period for the Cleanup Action Plan for the wood debris cleanup closed July 28, 2000.

In the second area, Occidental Chemical Corporation is working with EPA under a separate AOC for two Removal Actions to investigate the extent of, and cleanup options for, a subtidal area known as "Area 5106" and a contaminated embankment in front of the former Occidental facility and an adjacent property at the Mouth of the Hylebos Waterway. In Area 5106, the nature of the sediment contamination is different than other Hylebos sediments, and, if excavated, would require treatment prior to disposal. This area is referred to as the "Area 5106 and Embankment Study Area" in Figure 3a. EPA has issued a separate proposed Engineering Evaluation and Cost Analysis (EE/CA) document for Area 5106 and is receiving public comment during August 2000. After responding to public comments, EPA will prepare an Action Memorandum (analogous to this ESD) to implement the removal action. For the Area 5106 sediments, the EE/CA addresses only those sediments that require treatment prior to disposal. A separate comment period for the embankment area is expected in the fall 2000. EPA's selected action for the embankment area will also be documented in an Action Memorandum. Sediments around and under the 5106 removal area that exceed SQOs but that are outside of the embankment will be addressed under this ESD in the overall Hylebos cleanup. Depending on the selected remedy in EPA's Action Memorandum, an estimated 20,000 cy of treated dredge material from Area 5106 could be disposed of in one of the selected disposal sites identified in this ESD. Because the Area 5106 may be disposed of in one of the selected disposal sites after treatment, the estimated 20,000 cy volume has been included in the estimated total disposal volume for this ESD.

Hylebos Waterway Subtidal Cleanup

The HCC's studies showed that extensive areas at the mouth and head of the Hylebos Waterway, and more limited areas in the middle of the waterway, are contaminated with chlorinated organic chemicals (including PCBs, pesticides, hexachlorobenzene, and hexachlorobutadiene), PAHs, and metals, and will require remediation.

Under the requirements of the AOC, the HCC developed a Pre-Remedial Design Evaluation Report (November 8, 1999), which contains a proposed cleanup plan for contaminated sediments

in the Hylebos Waterway, and proposed disposal sites for dredged sediments. The proposed cleanup plan is shown in Figures 3a-c, and is described in more detail in the report.

As shown in Figure 3a, most of the waterway north of the 11th Street Bridge is to be dredged under the cleanup plan. The area in front of Ole and Charlie's Marina (Sediment Management Area , "SMA" 511), within and in front of the Chinook Marina (SMA 501), and a small area near the 11th Street Bridge (SMA 502) contain only low-level contamination and will be monitored as natural recovery areas.

In the middle of the waterway (Fig. 3b), three areas will be dredged: SMA 421 in front of Taylor Way Properties, SMA 321, a small area near Buffelen Woodworking, and SMA 322 in front of Murray Pacific Corp. (now Port of Tacoma), Modutech, and Hylebos Marina. There also are four small natural recovery areas in the middle of the waterway.

At the head of the waterway (Fig. 3c), most of the waterway from approximately station 110+00 to station 147+00 will be dredged, with the exception of a small natural recovery area at the General Metals graving dock and in front of the General Metals facility. In the upper turning basin, a small area of chemical contamination in front of the Puyallup Tribe's Outer Hylebos property will be addressed as part of this cleanup. The remainder of the upper turning basin will be addressed under a separate cleanup by the Hylebos Wood Debris Group. There are also some small natural recovery areas in the upper turning basin.

As discussed in Section IV, the cleanup must protect against exposure of buried contaminated sediments in the future. Based on existing information, EPA has designated areas for cleanup where there are high or moderate subsurface contamination levels that have a greater potential for exposure, due to their proximity to the navigation channel or remediation dredge areas. There are a few sampling stations with lower-level subsurface contamination, or with insufficient subsurface data to refine the dredging volume. In these instances these areas will require further evaluation during design to determine which areas present a long-term risk of exposure of significant levels of subsurface contamination (e.g., an estimated 20,000 cy area noted as SMA S44 in Fig. 3b must be refined). For the remaining areas not identified for EPA action in this ESD, where and when future dredging or excavation will occur is unknown, but any such activity will be overseen by regulatory agencies as required under the Clean Water Act and the Shoreline Management Act, thus immediate removal of such subsurface sediments is not required. EPA does, however, encourage parties with development needs that involve dredging to consider coordinating their activities with EPA's cleanup schedule. Such a coordinated effort could serve to reduce cost and streamline administrative processes for property owners more than if they wait to initiate work after the Superfund cleanup. This issue is discussed further in the following section, *Hylebos Waterway Cleanup Areas and Volumes*.

Areas requiring dredging will be dredged deep enough to expose clean sediments. In most cases this coincides with the depth of native sediments. Proposed thickness of dredging ranges from 2 to 20 feet, with an average of 6 feet.

The cleanup areas shown in Figures 3a-c represent a preliminary cleanup plan, with specific dredged material management areas and volumes to be finalized and approved by EPA in remedial design.

Hylebos Waterway Intertidal Cleanup

Figures 3a-c also show intertidal areas that require cleanup. The plan presented in the Pre-remedial Design Evaluation Report is for 11.6 areas under dock/structures and isolated intertidal areas to be capped. However, whether intertidal areas will be dredged or capped will be reevaluated in the design phase on a property by property basis, taking into account factors such as:

- protectiveness of the proposed cap,
- compatibility with current land use,
- property owner's willingness to implement use restrictions on the capped area and/or ensure such restrictions will run with the land,
- engineering constraints, and
- avoidance of habitat impacts and any necessary mitigation required under CWA Section 404.

Some intertidal cleanup actions have been addressed by individual property owners working with Ecology. Those intertidal cleanups where EPA has approved the final cleanup will not require remediation as part of the overall waterway cleanup. EPA will, however, determine whether long-term monitoring is needed at these properties as part of the waterway design process. To date, EPA has approved the intertidal cleanups at SMA 232 at General Metals of Tacoma and SMA 241 at the former USG Interiors facility (see Figure 3-c).

Hylebos Waterway Cleanup Areas and Volumes

The total area of the Hylebos Waterway is 285 acres. Under this cleanup plan, 85.5 acres of open access areas (825,000 cy) will be dredged, 11.6 acres (95,000 cy) of intertidal and dock/structure area will be either dredged or capped depending on the final remedial design, and 20.7 acres are natural recovery areas. Additional acreage will be cleaned up under the Occidental Chemical and Wood Debris Group response actions. The total dredging volume represented by the sediment cleanup shown on Figures 3a-c is 845,000 cy, which includes the 20,000 cy estimated for SMA S44. For the purposes of estimating needed disposal site capacity, EPA has assumed that both SMA S44 area, and the intertidal or dock/structures areas will be dredged for a total of 940,000 cy. The estimated cost of this remedy, assuming disposal of dredged sediments at the Blair Slip 1 disposal site and an Upland Regional Landfill is $46,137,000.

An additional volume of contaminated sediments in the Hylebos Waterway may require confined disposal if dredged for navigation or future development purposes. Hylebos Waterway is a federally authorized navigation channel with an authorized depth of -30 feet MLLW. EPA is working with the Corps to determine whether the Superfund cleanup can be coordinated with

additional dredging by the Corps at the request of waterway users. This would increase the volume of sediments dredged and requiring confined disposal, but would address waterway users' concerns about shoaling in the navigation channel. It would also minimize future ecological impacts due to dredging by helping to ensure that no further dredging of the Hylebos Waterway would be needed for many years.

Some property owners also may wish to include additional dredge areas if their future use plans may require dredging and, as a result, risk future exposure of buried contaminated sediments. Because of the difficulties associated with dredging and disposal of contaminated sediments, EPA encourages property owners and waterway users to consider any current or future additional dredging needs and to discuss with EPA whether this dredging can be coordinated with the cleanup. While dredging solely for navigation or other development purposes is outside the scope of this Superfund action, EPA will work with private parties and the Corps to integrate additional dredging activity into the remedial design schedule if there is interest by the parties. For the purposes of determining needed disposal site capacity, EPA has estimated that an additional 120,000 cy of capacity may be needed if a Corps dredging project and dredging by other waterway users is included in the cleanup.

A number of factors could alter EPA's estimate of 120,000 cy of additional sediment resulting from dredging. EPA's estimate of 120,000 cy is based on a conditions survey conducted by the Corps that estimated 120,000 cy of dredging would be needed to address shoaling areas that are currently impacting navigation in the waterway. The Corps' 120,000 cy estimate includes some overlap with the CERCLA remediation areas, however, it does not include any additional dredging to address contaminated surfaces that may remain after the shoaling areas are dredged, which could increase the volume. The Corp's estimate also does not address any potential needs for development purposes. The draft ESD cited an additional volume of 300,000 cy based on the possibility of a much larger Corps dredging project beyond the shoaling areas identified in the Corp's conditions survey.

To pursue any Corps dredging project would require resolution of a number of issues that cannot be fully addressed at this time, including level of interest by private parties. For example, any navigation dredging would need to be initiated by a local sponsor and would require private parties to coordinate with the Corps to determine the precise dredging volume and subsequent cost sharing arrangements required for dredging and disposal. EPA encourages parties with an interest in additional dredging to work together to resolve these issues.

Habitat Considerations

Remedial activities in the Hylebos Waterway would result in the dredging and/or capping of approximately 96 acres of bottom area during an expected 2-3 year construction period, sequentially eliminating non-mobile benthos over that area. These actions include the capping of 11.0 acres of intertidal and shallow subtidal habitat and the dredging of 85.5 acres of subtidal habitat. In the intertidal area, approximately 2.7 acres of intertidal habitat would be converted to subtidal habitat. The resulting substrate would consist of clean imported sand or clean native

sediment. These activities, along with natural recovery, would leave much less contaminated bottom sediment which is expected to result in improved habitat quality throughout the waterway. The bottom sediment exposed by dredging would re-colonize with infauna and epifauna, as would any cap sediment. Dredging and capping activities would cause temporary and localized impacts to water quality in the vicinity of the active equipment during the construction period. In-water work would be conducted during periods when few juvenile anadromous fish are present in the nearshore waters to reduce or eliminate the risk of direct impacts to this important resource. The net effect of these changes to the aquatic ecosystem would be the loss of 2.7 acres of intertidal habitat, which will require compensatory mitigation. The remedial actions may also result in the loss of a very small area of salt marsh (approximately 25 square feet). It may be possible to avoid impacting this area, and this will be closely scrutinized during development of the final project design. Habitat quality for the remainder of the site overall would increase because of the removal of contaminated sediments. Additionally, provision of soft or organic-rich substrates beneficial to salmonids (e.g., "fish mix" or a silt-sand mix) will be investigated for use as final capping material.

EPA will require compensatory mitigation consistent with the bay-wide mitigation and performance standards discussed in Section IV.F. to offset the 2.7 acres and any additional loss of habitat, as well as careful timing and monitoring of dredging and capping activities to assure minimal short-term impacts and minimal disruption of migratory salmonids. The resulting substrate should greatly benefit fish and wildlife resources by removing and isolating highly contaminated sediments from biological uptake. EPA will also ensure conservation measures are taken to protect ESA-listed species.

C. Middle Waterway

EPA and the Middle Waterway Action Committee (MWAC), which is comprised of Foss Maritime Co., Marine Industries Northwest, Inc., and Pioneer Industries, Inc., entered into an AOC for preparation of pre-remedial and remedial design studies for Middle Waterway in April 1997. Under the AOC, MWAC has completed two rounds of sampling to characterize the nature and extent of contamination. MWAC submitted a draft data evaluation report, draft evaluation of remedial options, and draft remediation plan to EPA in June 2000, which are currently under review by EPA. MWAC currently estimates that 75,000 cubic yards of contaminated sediments may require removal.

Contaminated sediments dredged from Middle Waterway will be disposed of in one of the sites selected in this ESD. EPA will issue a future ESD for public comment, which defines the areas of Middle Waterway to be remediated.

VI. DISPOSAL SITES

A. Background

Since 1996, EPA has held several meetings and discussions with potentially responsible parties, representatives of federal, state, and local government, Native American tribes, environmental

groups, and members of the public. EPA met with these parties in an effort to: 1) identify potential disposal sites that meet the criteria set forth in the 1989 ROD. 2) discuss the pros and cons of each site and 3) narrow the list of potential sites to those sites most acceptable to EPA and other parties. Ten sites were identified by this process. EPA's further internal analysis narrowed the list to a few candidate sites.

In June 1999, EPA issued a fact sheet that presented EPA's evaluation of disposal sites for confinement of contaminated sediments dredged from Thea Foss, Wheeler-Osgood, Hylebos, and Middle waterways. The fact sheet described the factors used to evaluate the disposal sites and provided a refined list of promising sites. The list included nearshore fills at Blair Slip 1 and St. Paul Waterway, and confined aquatic disposal sites at Mouth of Hylebos and the Hylebos Upper Turning Basin. Along with these four in-water sites, EPA retained the option to send some volume of contaminated sediments to a regional upland landfill. EPA stated that it would focus further technical evaluations on these promising disposal sites. EPA also solicited public comment on the evaluations and information provided in the fact sheet and the proposed disposal site list. The comments received on EPA's refined list of disposal sites were considered in developing this ESD, and are discussed in Section X.

Subsequent technical evaluations indicated that construction of the Hylebos Upper Turning Basin disposal site would involve serious technical challenges, and may adversely impact migrating salmon. The proposal for the Hylebos Upper Turning Basin disposal site was to build an underwater confined aquatic disposal (CAD) facility at the end of a long, narrow channel, in an area of low circulation and flushing. Due to ongoing deposition of fine sediments with high organic content, near-bottom dissolved oxygen levels drop below levels necessary to support sensitive aquatic species for much of the summer and fall. Dredging and disposal may further reduce dissolved oxygen levels. The turning basin is located at the mouth of Hylebos Creek, a salmon bearing stream. Fish must pass through the disposal site to reach Hylebos Creek. In EPA's judgement, the Hylebos Upper Turning Basin disposal site, while not infeasible, had some serious technical challenges to overcome, and it is uncertain whether migrating salmon could be protected during construction. For these reasons, EPA has not selected this disposal site.

In November 1999, EPA issued a draft ESD proposing disposal of dredged contaminated sediments at three in-water disposal sites: Blair Slip 1, St. Paul Nearshore Fill, and a CAD at the Mouth of the Hylebos Waterway. EPA believes the Mouth of Hylebos site satisfies EPA's threshold criteria of overall protectiveness and compliance with ARARs, and is cost effective and technically implementable. However, based on public comments and further evaluation of the Mouth of Hylebos disposal site, EPA has determined that it is not an administratively implementable alternative at this time. Several issues have been raised about use of the Mouth of Hylebos Waterway disposal site that have not been resolved, including:

1. the landowner, DNR's, stated preference that CADs only be used for temporary disposal while EPA sees them as a long-term solution
2. lease rates for use of state-owned aquatic land
3. need to relocate an existing lease holder at the mouth of the Hylebos;

4) a waiver or Plan amendment of the City of Tacoma's Shoreline Master Plan would be needed, because the majority of the mouth of Hylebos site is in the district S-13, which is designated a "conservancy environment"; and
5) numerous adverse comments received from homeowners, members of the public, and environmental groups.

All of these issues could potentially be resolved, however resolution is expected to be time-consuming. During that time, cleanup would be stalled.

Because EPA has determined that the Mouth of Hylebos CAD is not an administratively implementable alternative at this time, EPA is selecting upland disposal in a regional landfill as an element of the CERCLA remedy in conjunction with the Blair Slip 1 and St. Paul Waterway disposal sites. EPA has determined that the upland regional landfill alternative is feasible and cost-effective, and best meets the CERCLA evaluation criteria.

After the public comment period on the draft ESD closed (February 2000) and the many issues concerning the CAD site at the Mouth of the Hylebos were clarified, a group of four Hylebos Waterway potentially responsible parties hired a neutral third-party facilitation firm, Merritt and Pardini, and requested EPA's support and participation in a public outreach process to develop a solution for disposal of contaminated sediments dredged from Hylebos Waterway. EPA participated in the outreach process, which consisted of a series of three workshop sessions held over a three-month period from March through June 2000. A summary of the workgroup sessions and the workgroup's "Consensus Statement and Conclusions" were provided to EPA on June 21, 2000. The consensus statement is to:

1) Maximize the capacity of Blair Slip 1;
2) Maximize the use of upland industrial fill site(s) (i.e., Kaiser, others);
3) Upland disposal, capping, and Puget Sound Dredged Disposal Analysis [PSDDA; now Dredged Material Management Program (DMMP)] disposal as appropriate for residual volumes based on successful implementation of items 1 and 2;
4) Make sediment available for a treatment bench test if requested by a vendor; and
5) Based on assumed volume (of 940,000 cy) and contingent on the success of items 1 through 4, the Mouth of Hylebos CAD site is not part of this consensus statement.

In response to these recommendations, EPA agrees with the workgroup's recommendation (item 1) that the capacity of Blair Slip 1 be maximized to the extent practicable. EPA will also extend this recommendation to the St. Paul Waterway disposal site. The outreach forum's recommendation on upland industrial fill (item 2) was presented in sufficient concept-level detail to allow for further development during remedial design. The information presented in the recommendations was not, however, sufficient to allow EPA to select alternative on-site upland disposal sites rather than disposal of dredged materials in an upland regional landfill. EPA will allow PRPs to develop such alternatives during remedial design. If they can be demonstrated to EPA's satisfaction to be compatible with existing land use, protective of human health and the environment, compliant with applicable, or relevant and appropriate requirements and cost

effective, then EPA will consider these on-site alternatives as a means to reduce or eliminate the need for disposal at an upland regional landfill.

EPA's ESD includes upland disposal, capping and DMMP disposal as appropriate (item 3). EPA is also willing to make contaminated sediments available to a vendor for bench testing of treatment technologies (item 4), if requested and if compatible with the cleanup schedule, but will not require any such testing of the potentially responsible parties (PRPs).

In summary, EPA has selected Blair Slip 1 and the St. Paul Nearshore Fill and disposal at an upland regional landfill as disposal sites to contain contaminated sediments dredged from Hylebos, Thea Foss, Wheeler-Osgood, and Middle Waterways. The location of these disposal sites is shown in Figure 4. EPA will consider an upland on-site fill as an alternative to disposal at an upland regional landfill if it meets the criteria discussed above. More detailed information about the selected disposal sites is provided below.

B. St. Paul Nearshore Fill

The St. Paul Nearshore Fill (see Fig. 4) will consist of a containment berm and dike of clean dredge material and/or select fill material across the mouth of the waterway. New intertidal habitat will be constructed on the face of the berm.

The fill will create an upland area on top of which Simpson Tacoma Land Company (hereafter Simpson) plans to expand its manufacturing facilities. In order to accommodate the volume of material that needs to be dredged from the Thea Foss, Wheeler-Osgood, and Middle waterways, the St. Paul Waterway must be deepened. A preliminary facility layout that will be refined in the final design process indicates that the St. Paul Fill will have a capacity of approximately 600,000 to 750,000 cubic yards. EPA requires that the St. Paul Nearshore Fill be utilized to its maximum feasible capacity. Once all the contaminated material that needs to be disposed is placed into the St. Paul Fill, the area will be covered by a 6 to 7 foot thick cap.

Construction of the St. Paul Fill will require relocation of the log haul-out facility currently located at the head of the St. Paul Waterway. Simpson is proposing to relocate the facility to the inner end of the subtidal portion of Middle Waterway, at the mouth. Simpson will need to receive approval from Ecology to ensure that their plans are consistent with Ecology policy concerning new log rafting and haul out areas. The relocated log haul out facility must be designed to avoid and minimize habitat impacts and to meet the Best Management Practices (BMPs) in the City of Tacoma's Shoreline Program and comply with practices recently agreed upon for log haul out in Hylebos Waterway (e.g. no log grounding and bark control). Design details of the facility will also need to be approved by EPA.

The creation of the nearshore fill will result in the loss of approximately 13.6 acres of littoral and subtidal aquatic habitat, including 7.6 acres of mudflats. This particular habitat loss is of great concern to EPA, the Trustees, the Puyallup Tribe, and other interested parties. Although the site has been degraded by historic industrial and commercial navigation use, it still provides important

fish and wildlife support functions (refugia, feeding, migration) and compensatory mitigation is required to offset loss of habitat and other impacts.

After evaluation and input from the interested parties, Simpson developed a compensatory mitigation plan to offset losses due to the proposed nearshore fill. The mitigation plan was designed to emphasize recovery for migratory salmonid populations by providing a nearshore habitat connection between the Puyallup River and other existing nearshore habitats. The plan includes approximately 25 acres of estuarine habitat comprised of 15 acres of enhanced and 10 acres of created intertidal habitat, creation of a tidal channel and wetland marsh with a fresh water source, and preservation of land for a potential connector channel between the Puyallup River, the marshland, and Middle Waterway.

At this time, EPA is uncertain of the ability of the Upper Middle Waterway mitigation area to fully function as claimed. EPA believes there are insufficient baseline fish use and salinity data in both St. Paul and Middle Waterways to provide reasonable assurance that juvenile salmonid use will equal or exceed current use levels within the St. Paul Waterway impact area. This uncertainty is partially related to the fact that the St. Paul Waterway is closer to the Puyallup River and its associated fresh water turbidity plume compared to the more distant upper Middle Waterway. Consequently, the provision of a perennial source of river water to the compensatory mitigation lands in the upper Middle Waterway is critical to its functional success toward conservation and recovery of salmonids.

The Habitat Plan (April 2000) notes an option for supplying fresh water from the Puyallup River via rehabilitation and use of a City of Tacoma soon-to-be-abandoned water line along 11th Avenue that will become available in the year 2000 after a new water line is constructed. This pipeline option could potentially allow transfer of the necessary volume of fresh water to the Middle Waterway to achieve immediate benefits to salmonids, including development of brackish marsh habitat. In the future the pipeline could provide fresh water to potential restoration of intertidal brackish marsh and tidal channel habitats in the Delta Reserve/former industrial properties south of 11th Avenue.

EPA is requiring that this pipeline option, and other fresh water source(s) as necessary to meet the volume specifications, be implemented to assure full function of the mitigation project and, in part, to compensate for resource losses from the remedial activities in the Thea Foss Waterway.

Design of the pipe must meet the following requirements:

a) Maximize flow volume, but at a minimum must provide enough volume to create a freshwater lens six inches deep under stratified conditions and extends at least two-thirds the length of the waterway. Pumped artesian well water can be used as necessary to achieve the minimum flow volume. Appropriately treated stormwater or stormwater that meets the appropriate discharge standards may also be used to supplement the flow, but the preferred supplemental source is artesian well water.

b) The capability to eventually divert flows from upper Middle Waterway to the former industrial properties south of 11th Avenue, if those properties are acquired for restoration purposes.

Additionally, EPA has determined that the *risk* of mitigation success/failure must be specifically factored into habitat plans and provided for up-front rather than solely as a post-construction contingency. Accordingly, EPA will require additional acres of aquatic habitat be constructed in addition to what is proposed in the *Habitat Plan and Design Report* (2000) to offset the risk of mitigation failure. EPA will ensure that the requirements specified in this section, and the performance criteria specified in Section IV.F., are included in a final compensatory mitigation plan during remedial design that must be approved by EPA.

C. Blair Slip 1

The Blair Slip 1 disposal site is located at the mouth of the Blair Waterway. The Port of Tacoma has applied for a permit to fill this slip to the ground surface with clean fill (although they have indicated a willingness to use contaminated sediments as fill if required by EPA). The fill project would consist of constructing a berm across the front of the existing slip and filling behind the berm with contaminated sediments to an elevation of +9 feet MLLW, then adding a 7-foot sand cap, converting 13 acres of aquatic land to upland. This fill would be part of a larger Port project to build a new terminal at this location. The Port's permit application is currently under review by the Corps. With this ESD, EPA requires that this slip be filled with contaminated sediments. The current capacity of this site is 640,000 cy.

Information developed by the Port of Tacoma indicates that the slip capacity could be expanded to 750,000 cy if additional clean material is dredged from the bottom of the slip and sent for disposal at a DMMP open-water site. This ESD requires Blair Slip 1 to be designed to utilize its maximum capacity for contaminated sediments to the extent technically practicable.

The creation of a nearshore fill at this site will result in the loss of 13.1 acres of aquatic habitat (including 3.1 acres of intertidal and shallow subtidal habitat). Large piers currently cover the majority of the intertidal and shallow subtidal habitat. An additional 1.1 acres of subtidal habitat would be converted to shallow subtidal and intertidal habitat. Approximately 0.6 acres of existing subtidal habitat would be modified into sloping subtidal habitat.

Mitigation is required under Section 404 of the Clean Water Act to compensate for the impact of the fill on marine habitat. The draft compensatory mitigation plan for use of Blair Slip 1 (December 1998) that was submitted to the Seattle District, Corps of Engineers, as part of the permit application process is insufficient to offset habitat losses and it is unclear as to how it would contribute to conservation and recovery of ESA-listed species. EPA believes that the Simenstad report demonstrates that there is sufficient opportunity within the Commencement Bay and lower Puyallup River watershed to develop compensatory mitigation that also supports conservation of ESA-listed species. Final compensatory mitigation plans will follow the performance criteria discussed in Section IV.F.

D. Upland Regional Landfill

For the purposes of evaluating the upland regional landfill alternative, EPA identified two upland regional landfills that have the capacity to accept the possible dredging volume of Hylebos sediments: Roosevelt Regional Landfill near Goldendale, Washington, and Columbia Ridge Landfill near Arlington, Oregon. These sites are licensed Subtitle D commercial landfills. Bulk chemistry testing during pre-design indicates the sediments in areas other than "hot spots" (see Section II.C.) are suitable for disposal in a Resource Conservation and Recovery Act Subtitle D landfill for solid waste; additional testing will be done in design to confirm this. Both are approximately 200 miles from Tacoma. Dredged sediments would be offloaded landside into a confined stockpile/dewatering area. The location of this temporary disposal area has not yet been identified, however, there are vacant parcels on the shoreline in the vicinity of the dredging project that would provide sufficient capacity. Depending on the weather and water content of sediments, an extended period may be required for dewatering. The free water and interstitial water drained off during the rehandling process would be treated as necessary to meet water quality standards as required by the Clean Water Act and then discharged back to the waterway. After the sediment has been dewatered, it would be loaded into trucks, transported to a rail transfer facility, and transported to the landfill by rail. No compensatory mitigation is deemed owing for disposal of material into an upland regional landfill; although the requirement to avoid and/or minimize adverse impacts is still applicable.

E. Utilization of Disposal Sites

The City of Tacoma has recommended to EPA that the Thea Foss and Wheeler-Osgood contaminated sediments be placed in the St. Paul Nearshore Fill and, if possible, also the contaminated sediments from Middle Waterway. Blair Slip 1 and an upland regional landfill would then be used for the contaminated sediments from the Hylebos Waterway. EPA supports this mix but reserves the flexibility to allow the PRPs to make adjustments during design based on final disposal capacity, volumes, and timing. EPA also will continue to review disposal site designs to ensure that environmental impacts are minimized and unavoidable impacts are adequately compensated.

VII. STATUS OF SOURCE CONTROL

A. Background

The ROD recognized that the sources of contamination throughout the CB/NT Superfund site would have to be controlled before sediment cleanup could be achieved. The cleanup strategy for CB/NT has been to eliminate or reduce ongoing sources of problem chemicals to the extent practicable before implementing in-water cleanup actions. While Superfund is an effective tool to clean up existing contamination, other authorities are needed to address ongoing releases. Several federal, state and local programs were identified as tools to address source control independently of Superfund. In 1989, EPA and Ecology entered into an agreement that identified the Ecology

Commencement Bay Urban Action Team (UBAT) as lead for implementing source control actions. Ecology uses many regulatory tools to control sources, including the Model Toxics Control Act (MTCA) to address upland and groundwater sources and pollutant discharge permits under the Clean Water Act to address direct discharges to the waterways. Ecology reports its progress on the control of sources to EPA and consults with EPA on whether source control is sufficient to move forward with in-water clean up actions.

This ESD does not propose any changes to the source control strategy set forth in the 1989 ROD or the 1992 Source Control Strategy. However, additional information is provided below on how the strategy is being implemented at Thea Foss, Wheeler-Osgood, and Hylebos waterways.

The administrative mechanism used by Ecology to inform EPA of its progress on source control is a series of reports called Milestone Reports issued for each problem area identified in the ROD. There are five types of Milestone Reports and their purpose is as follows:

Milestone 1 - On-going Confirmed Sources Identified. Ecology has investigated and evaluated all potential sources, and identified all on-going, confirmed sources of problem chemicals.

Milestone 2 - Essential Administrative Actions in Place for Major Sources. Ecology has issued administrative actions, such as orders, consent decrees, or permits, to address major sources of problem chemicals in each problem area to ensure that they will be controlled to the extent necessary to prevent sediment recontamination. Major sources are those most directly linked with current sediment impacts.

Milestone 3 - Essential Remedial Action Implemented for Major Sources. Ecology has implemented all of the remedial actions, such as upland soil cleanup, adoption of best management practices, storm drain cleaning, etc., for all major sources. Essential remedial actions are those needed to eliminate or reduce those contaminant sources that are most likely to recontaminate sediments.

Milestone 4 - Administrative Actions in Place for All Confirmed Sources. Ecology has implemented all of the administrative actions discussed under Milestone 2 for all confirmed sources.

Milestone 5 - Remedial Action Implemented for All Sources. All essential source control work under the decrees, orders, or permits has been completed.

To date, Ecology has completed the following Milestone Reports for Hylebos, Thea Foss, and Wheeler-Osgood waterways:

Mouth of Thea Foss: Milestones 1 through 5
Head of Thea Foss: Milestones 1 and 2
Wheeler Osgood: Milestones 1 through 5

Mouth of Hylebos: Milestones 1 through 5
Head of Hylebos: Milestones 1 through 5

EPA expects that all Milestone Reports will be submitted and approved by the end of 2001.

The following sections provide more detailed information about completed and on-going source control actions at Thea Foss, Wheeler-Osgood, and Hylebos waterways. Because the nature of the sources of contamination are quite different between the Thea Foss/Wheeler-Osgood Waterways and the Hylebos Waterway, the types of source control implemented and issues associated with them are different. While much of the source identification and control work at all waterways has focused on working with individual facilities, Thea Foss Waterway has presented some unique challenges due to several large storm drains discharging into the waterway and multiple sources and deposits of NAPL.

B. Thea Foss and Wheeler-Osgood Waterways

Ecology identified numerous sources to the Thea Foss and Wheeler-Osgood waterways and took cleanup action. Some of the sources that were cleaned up include the following:

D Street Petroleum (groundwater at petroleum facility)
Superior Oil (groundwater at petroleum facility)
UNOCAL (groundwater at petroleum facility)
BP Oil (groundwater at petroleum facility)
Totem Marine Services (boat yard, hull washing)
Picks Cove (boatyard, hull maintenance, stormwater)
J.M. Martinac (shipyard, stormwater and sandblast grit on beach)
Marine Iron Works (storm drains)
West Coast Grocery (storm drains)
1147 Dock Street (bank contamination)
Chevron Bulk Plant (soils)
MPS/Truck Rail Handling (storm drains)
Kleen Blast (storm drains)
Olympic Chemical (groundwater)
City-owned parcels (various historical sources on west shore)

In addition to Ecology's efforts to control independent sources at Thea Foss and Wheeler-Osgood waterways, the City of Tacoma has been actively involved in controlling municipal sources by implementing the Stormwater Management Plan for Thea Foss Waterway. The program is required as part of the City's NPDES permit and lays out a step-wise, on-going process for characterization of effluent, identification and prioritization of potential chemical sources, actions to address sources, and monitoring and reporting on results. Under this program, the City of Tacoma has conducted hundreds of inspections, required businesses to implement best management practices, and required cleaning of stormwater drains, lines and catch basins. These actions, coupled with Ecology's efforts, have eliminated or reduced numerous significant sources

of contamination to stormwater discharging to the waterway. A summary of the stormwater source control actions undertaken for the Thea Foss and Wheeler-Osgood waterways by the City of Tacoma is described in the Round 3 Data Evaluation and Pre-Design Evaluation Report.

While much progress has been made and many sources have been eliminated or reduced, source control is and will continue to be an ongoing prevention activity. Based on existing information, there continues to be some risk of recontamination of sediments towards the head of the Thea Foss Waterway if further actions are not taken to reduce sources of BEP (bis[2-ethylhexyl] phthalate) and PAHs (polycyclic aromatic hydrocarbons). Ecology still must select and implement a cleanup for the coal tar and creosote sources on the uplands at the head of the Thea Foss Waterway. The City of Tacoma also must implement further actions, including potential capital improvements to the municipal storm drains to reduce contaminant loadings to eliminate or significantly reduce the potential for recontamination of sediments. EPA and Ecology are working to ensure that appropriate controls are being applied to the stormwater sources considered likely to contribute to sediment recontamination. Additionally, in accordance with the ROD, results from the monitoring of sediments and effluent discharges will be used as feedback to the regulatory agencies who will monitor the effectiveness of source control actions. See Section IV for additional discussion about and specific requirements for source control.

C. Hylebos Waterway

Ecology identified 10 major ongoing sources to Hylebos Waterway sediment contamination:

Occidental Chemical Corporation (manufacturer of chlorine and chlorine-based chemicals)
Elf Atochem 3009 Taylor Way (inactive log sort yard)
Elf Atochem 2901 Taylor Way (former manufacturer of chlorine-based chemicals)
Kaiser Aluminum and Chemical Corp. (metal fabricator)
General Metals of Tacoma (metal scrap yard)
Wasser Winters (inactive log sort yard)
Louisiana Pacific (operating log sort yard)
Tacoma Boat (former large shipyard)
B&L Landfill (drains to Hylebos Creek)
Blair Backup Property (inactive log sort yard)

Essential source control actions have been completed for all of these facilities, as documented in Ecology's milestone reports for Mouth and Head of Hylebos Waterway.

In addition, Ecology identified 19 other ongoing sources of contamination to Hylebos Waterway sediments. Essential administrative actions (orders, decrees, or permits) are in place to address all of these sources of problem chemicals to Hylebos Waterway sediments, as documented in Ecology's November 1999 Milestone 4 reports for Mouth and Head of Hylebos Waterway. Ecology issued its Milestone 5 reports, documenting completion of source control for all Hylebos Waterway sources on June 14, 2000.

Ongoing sources of sediment contamination from these facilities have been addressed through a variety of permit and cleanup actions, including excavation and/or capping of upland contaminated soils, groundwater pump and treat, installation of sheet pile barrier walls, control of industrial and storm water discharges, and long-term monitoring programs. Appended to the Milestone 3 and 4 reports for the Head of Hylebos Waterway are evaluations of the effectiveness of groundwater and stormwater controls in preventing sediment recontamination after the completion of source control actions. These technical memoranda describe a conservative approach, based on data collected after source control actions have been completed, to estimating stormwater and groundwater contaminant loads to sediments. A similar analysis was completed for Mouth of Hylebos facilities in the Mouth of Hylebos milestone reports. The evaluation concluded that, in general, there was a very low risk of recontamination of Hylebos Waterway sediments from groundwater or stormwater discharges. Nonetheless, in accordance with the ROD, Ecology will continue to monitor and evaluate the effectiveness of source control actions.

VIII. SUPPORT AGENCY COMMENTS

Ecology concurs with this ESD. In particular, Ecology supports EPA's efforts to work with the Corps to integrate the Superfund cleanup on the Hylebos Waterway with a navigational dredging project and dredging for private development purposes. Ecology offered to explore grant funding opportunities to facilitate this additional dredging. Ecology is concerned about responsibility for oversight of navigational dredging of contaminated sediments after the Superfund cleanup. Finally, Ecology encourages EPA to begin cleanup in 2001.

The Puyallup Tribe also concurs with this ESD. However, the Tribe stated concerns about a number of things they believe need to be emphasized in the remedial design to support salmon recovery. These include:

a) emphasize permanence and long-term effectiveness in the cleanup design;
b) design intertidal cleanups to prevent or minimize habitat loss; and
c) avoid use of natural recovery as a cleanup method as much as possible.

The Tribe also stated their support for the bay-wide mitigation approach (see Section IV.F.) and providing "up-front" mitigation to address uncertainty in mitigation plans.

EPA will continue to coordinate with Ecology and the Puyallup Tribe to incorporate their concerns to the extent possible during remedial design and implementation of the cleanup. Concurrence letters from Ecology and the Puyallup Tribe are attached as Appendix B.

IX. AFFIRMATION OF THE STATUTORY DETERMINATION

Considering the new information that has been developed in this ESD and in the Administrative Record, EPA believes that the cleanup plan is and will be protective of human health and the environment, complies with Federal, State and Tribal requirements that are applicable, or relevant and appropriate to this remedial action as identified in the ROD (with the addition of ESA), and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. However, because treatment was not found to be

practicable, this remedy does not satisfy the statutory preference for treatment as a principle element. Because this remedy will result in hazardous substances remaining onsite above health-based levels, a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

X. PUBLIC PARTICIPATION ACTIVITIES

EPA has held regular public meetings and has issued many fact sheets to update the public on its activities since the ROD was signed in 1989. Because the selection of disposal sites was of particular interest to the public, EPA has held a series of "Disposal Sites Forum" meetings since 1996. In these meetings, options for sediment disposal were discussed with members of the public, government agencies, Native American tribes, environmental groups, and industry representatives. The group developed a list of candidate sites considered "most promising" for sediment disposal. All of the sites that were considered by EPA are on that list.

EPA mailed a fact sheet and held a 45-day public comment period from July 1, 1999 to August 16, 1999 on its proposed refined list of disposal sites. The refined list included four sites. Approximately 100 people attended a public meeting on June 21, 1999 to discuss the refined list, as well as the latest information on source control and the waterway cleanup plans. EPA also held two meetings with homeowners who live near the location of the proposed Mouth of Hylebos disposal site on July 28, 1999 and November 3, 1999, for a more detailed discussion of that disposal site. On January 12, 2000, Chuck Clarke, EPA's Regional Administrator, met with residents of Marine View Drive to hear their concerns about the proposed Mouth of Hylebos disposal site.

EPA considered the comments received from the public in developing the draft ESD. EPA received more than 20 letters commenting on the June 1999 fact sheet. Many letters urged EPA to move forward with the cleanups of the waterways and to select the St. Paul Nearshore Fill site as a disposal site. There were also letters expressing opposition to the Mouth of Hylebos disposal site. The issues raised in these letters included concerns about noise during construction, concerns about construction activities impeding water access, the site's geologic stability, the impact on property values, the potential effect on the drinking water supply, the impact on homeowner views, and others. EPA also received comments from a number of people who support disposal on state-owned aquatic lands and who urged use of a CAD site.

EPA mailed a fact sheet describing the draft ESD to 1300 people. A public comment period was held from November 29, 1999 to January 3, 2000. Over 100 people attended a public meeting held by EPA on December 8, 1999 to discuss its proposal and take comments from the public. A request for an extension to the comment period was received, and the date to submit public comment was extended until February 2, 2000.

EPA received 150 comment letters during the public comment period. Many letters expressed opposition to the proposed Mouth of Hylebos disposal site and to the proposed cleanup action at

the head of the Thea Foss Waterway. Comments were received from the Puyallup Tribe and from state and federal resource agencies who expressed concerns related to the specific cleanup plans and mitigation proposed under the Clean Water Act

As a result of the opposition to this proposed site, a group of potentially responsible parties called Partnership for a Clean Waterway (PCW) hired a consultant, Merritt & Pardini, to conduct a series of workshops to look for creative solutions to the cleanup of the Hylebos Waterway. Three workshops were held from March through June 2000. The workshops brought together federal, state, and local agencies, the tribes, and interested community members to identify concerns and explore alternatives to the Mouth of Hylebos CAD site. EPA attended all of the meetings, and the information has been considered for the final decision in this ESD. EPA has placed the recommendations that resulted from the Merritt-Pardini workshops in the administrative record. In particular, EPA has incorporated the recommendations to maximize the capacity of Blair Slip 1 to the extent practicable and to allow further consideration of upland disposal on an upland parcel(s) of property if implementable and in compliance with any ARARs.

A summary of the comments received during the public comment period and EPA's responses is included as Appendix C to this ESD.

Signed:

Michael F. Gearheard, Director
Office of Environmental Cleanup

8/3/00
Date

Appendices

A Cost Summaries for the Hylebos, Thea Foss and Wheeler Osgood Waterway Remedial Actions

B State of Washington Concurrence Letter
Puyallup Tribe of Indians Concurrence Letter

C Responsiveness Summary